Final Report

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Environmental sustainability: understanding the attitudes and behaviour of Australian households

authored by

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EXECUTIVE SUMMARY

This report describes research that aimed to understand the water and energy use and waste reduction attitudes and practices of Australian households and how these have changed over time. Although there is a growing body of research investigating the determinants of household sustainability practices and interventions that can positively impact on them, very little of this research has been conducted in the Australian context and there is no systematic examination of how the key socio-demographic variables of tenure, household composition and household income influence household sustainability practices.

The theoretical framework adopted in this research was an extended version of the Theory of Planned Behaviour (TPB), a well-established model of decision-making. The theory provides a rigorous methodology for investigating the social and psychological determinants of behavioural intentions and actions. The research comprised two parts. A quantitative online survey of 1194 households (601 in Brisbane and 593 in Melbourne) was conducted in December 2009 which assessed the TPB variables and other focal variables. Respondents were asked questions in relation to household water conservation, energy conservation and waste minimisation. In relation to water and energy conservation, a distinction was made between everyday actions that can reduce energy and water (Curtailment actions) and installing efficient appliances that result in ongoing savings (Efficiency actions). The survey was followed up by qualitative interviews (participants were recruited from the survey participants) conducted between December 2009 and January 2010 with twenty-two householders (eleven in Brisbane and eleven in Melbourne) who varied in their tenure, household composition, and household income level. The research was conducted across two sites to examine whether the findings generalised across different climatic regions of Australia.

Summary of key findings

In general, the findings from the qualitative interviews corroborated the findings from the survey.

Attitudes and practices

The results of the research show that respondents had overwhelmingly positive attitudes to water and energy conservation and actions that minimise waste. They also perceived widespread normative support for these actions and, on average, most respondents felt control over and felt confident that they could reduce water use, energy use and waste through everyday actions and through installing efficient appliances. There was evidence that respondents felt greater control over engaging in everyday water and energy conservation practices than installing water and energy-efficient appliances.

Commitment to engaging in household water and energy conservation and waste minimisation in the future was also high, although again, respondents reported greater commitment to everyday water and energy conservation practices than installing water and energy-efficient devices.

The interviews identified the important beliefs that underpin attitudes, confidence and normative support relating to household sustainability practices. More positive attitudes are likely underpinned by beliefs in the cost savings and environmental benefits of saving resources with cost saving usually cited as the most important benefit. Beliefs likely to underpin negative attitudes centred on the inconvenience

(e.g. of turning electronic equipment off at the power point) of the actions, the costs associated (e.g. of efficient appliances) and the ineffectiveness of efficient or sustainable appliances and products. Beliefs about the facilitators and barriers to sustainability actions were also identified. The factors most often mentioned as facilitators of everyday sustainability actions were receiving feedback about usage, developing 'good' habits, reminders from the media, incentives to 'do the right thing', cost savings associated with conservation, and bottom-up education processes. The main factors mentioned as facilitators of installing efficient appliances are rebates and labelling. The key factors that were cited as barriers to everyday sustainability actions are breaking old habits, the behaviour of others (e.g. household members who take long showers), living in rental properties and any costs involved (e.g. of buying products with recycled packaging). Tenure, costs, lack of access to government rebates and lack of 'fit' of the appliance to the household situation, were most often cited as barriers to installing efficient appliances. Respondents suggested that their family and friends and most people would approve of engaging in the household sustainability practices, suggesting growing normative support for these types of actions in the community.

Respondents reported that many of the everyday practices that help households to save water and energy have become a habit, with a majority of householders reporting that they always engage in a range of water and energy-saving practices. The practices that had lowest uptake were taking shorter showers, using greywater on the garden, switching off appliances at the power point, and switching off unused computers and electronic equipment. A majority of respondents had installed water-efficient appliances, including low-flow taps and showerheads, hoses with triggers or timed watering systems, water-efficient washing machines, and dual-flush toilets. A majority of respondents had also installed compact fluorescent lighting and energy-efficient white goods. Only a small minority (between 5% and 12%) had installed solar hot water or solar panels. Consistent with the survey results, qualitatively householders reported major changes in water conservation practices (e.g. more water-wise gardening; installing low-flow shower heads, water-efficient washing machines) and to a lesser extent changes in energy conservation practices such as switching off appliances at the wall. The survey results show that practices aimed at minimising waste were less established than the water and energy-saving practices and reusing plastic bags was the only practice that a majority engage in all the time. Householders who were interviewed reported that the biggest changes have been using one's own bags when shopping, saying no to plastic bags and avoiding disposable products.

Socio-demographic differences

Although the differences across tenure, household composition, and household income groups on the attitudinal and behavioural measures were not always clear or consistent, the strongest differences emerged between owners and renters. Owners reported stronger intentions to conserve water, they engaged in more everyday water-conserving practices and they had installed more water-efficient appliances than renters. There was also some evidence that owners had more positive attitudes to energy conservation, stronger intentions to conserve energy, had installed more energy-efficient appliances, and had stronger intentions to install energy efficiency appliances in the near future than renters. The differences across household composition groups were less frequent and less marked; where they did emerge the general pattern was for single-person households to conserve through everyday actions, whereas multiple-person and family

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households were more likely to conserve through installing efficiency devices. Differences across household income groups were few; where they did emerge they indicate more positive attitudes and more sustainable behaviour from low-income households than medium or high-income households.

Changes in practices over time

In response to questions about changes in practices over the past three years, on average, householders reported that they had reduced their water and energy use and the amount of waste they produce with a majority (between 57% and 62%) of respondents in Brisbane and Melbourne reporting that they had decreased their water use. The key reasons that householders cited for decreased water use were awareness of environmental threat (e.g. drought), government regulation (e.g. water restrictions), environmental concern and awareness of ways to save water. The major reason provided for reductions in energy use was awareness of ways to save energy, and for waste reduction, awareness of ways to reduce waste and environmental concern were the key reasons cited. Similarly, among householders who were interviewed, the reasons provided for changes in practices were government regulation (in relation to water), reducing costs, increased awareness of environmental impacts, desire to conserve resources, environmental concern and social norms.

Predicting household past sustainability practices and future sustainability intentions

Analyses were conducted to investigate the main determinants of energy and water conservation and waste minimisation commitment and current behaviour. The importance of these analyses is that they take into consideration the relative importance of all the socio-demographic and psychological variables, thereby showing which variables are statistically significant predictors when all variables are taken into account. The findings relating to commitment (i.e. future intentions) highlight the importance of psychological variables: greater commitment to saving energy and water and reducing waste was related to more positive attitudes to the practices, perceiving social support from important others to engage in the practices, and feeling confident that one can engage in the practices. Past practices and habits also impacted on commitment with greater engagement in these actions in the past related to greater commitment to them in the future. In terms of predictors of past levels of water and energy conservation and waste minimisation, older householders engaged in more of these practices and home owners engaged in more everyday water conservation actions, had more outdoor water-efficient appliances installed and more energy-efficient appliances installed than renters. Again, positive attitudes and perceived social support for these actions were also important determinants of current practices. The analyses also showed that household culture, that is, the extent to which households think of themselves as environmentally sustainable and agree among householders that being environmentally sustainable is important, is also a powerful determinant of how much respondents have engaged in sustainable waste, water and energy practices.

Support for household sustainability policies

In response to a set of policies aimed at promoting household environmental sustainability, respondents were much more supportive of strategies that facilitated voluntary change (e.g. installing efficient appliances, labelling, government campaigns) than of strategies that used pricing mechanisms (e.g. taxes, increased price of water, energy, waste collection) as a way of promoting

positive change. Strategies that involve regulation were more supported than the pricing policies but less than the voluntary change policies. For the households who were interviewed, although participants supported the strategy of having building codes that require homes to be environmentally sustainable, there was some concern about the added costs to the building process. Interestingly, there was also support for laws that require products to be environmentally sustainable, despite recognition that this might increase the costs of products. In this case, participants accepted the idea that they may need to be forced to buy sustainable products, although an argument was made for the need for long-term implementation of the strategy. Householders also deemed that the tax and pricing strategies were less fair than other strategies and they were most often nominated as unfair to vulnerable groups in Australia.

Implications of the results are discussed in relation to current and future policy development.

1 INTRODUCTION

The threat of climate change has placed environmental sustainability squarely at the centre of the policy agenda. Governments around the world, including Australia, are developing policies aimed at reducing carbon emissions and promoting sustainable practices. Clearly, change needs to happen at all levels, including the international, intra-national, institutional, household and individual level. Australia's per capita greenhouse gas emissions are among the highest in the world (Garnaut 2008) and households account for a fifth of Australia's greenhouse gas emissions (Department of Climate Change and Energy Efficiency 2010). Thus, the household in its discrete dwelling setting is a significant site for action. There is a need to understand how to facilitate more efficient use of resources through installation of devices that promote resource conservation and efficiency (i.e. efficiency actions) and through changed household practices (i.e. curtailment actions). In line with this need, Australian state and Commonwealth governments have introduced policies aimed at promoting household sustainability through, for example, offering rebates and green loan schemes for the installation of energy and water-efficient appliances (e.g. solar panels, solar hot water, rainwater tanks, household insulation). Education programs that promote energy and water-efficient practices are also evident (e.g. Queensland government Climate Smart Living program).

While these policies and programs represent a positive step toward promoting household sustainability, more research is needed to fully understand how we can move Australian households toward sustainability. There is a need to understand current sustainability practices of Australian households with a view to identifying the factors that facilitate or undermine engagement in these practices. There is also a need to understand how household sectors may differ in this area. There is recognition that certain household sectors, for example those on low incomes, may be disproportionately impacted by future climate adaption and mitigation measures in the Garnaut climate change review (2008). This assertion highlights the need, not only to develop an understanding of the factors that underpin householders' sustainability decisions, but also to explore the ways in which these decisions may be impacted by socio-demographic factors. The aim of the current research is to understand the key factors that underpin household sustainability decisions and the ways that more sustainable decisions can be promoted. The current research also seeks to explore householders' responses to a range of policy options that currently exist or may be introduced in the future.

1.1 Review of past literature

As part of the Positioning Paper attached to this research project, Fielding et al. (2009) conducted a comprehensive review of the scholarly literature on determinants and interventions relating to household energy and water conservation and recycling. The following section summarises conclusions drawn from that review. Fielding et al. concluded that the profile of a sustainable household varied depending on whether the focus was on waste, energy or water. In terms of values and motivation, energy-conserving households tended to care less about comfort and be more focused on the health benefits of energy conservation (e.g. Clark et al. 2003; Guerin, Yust & Coopet 2000). Energy conservers were motivated by the desire to save money, to make a contribution, to benefit themselves and to fit in with their social group (Gmelch & Dillman 1988). A clear socio-demographic profile of energy conservers did not emerge; however, energy-conserving households tended to be small dwellings with fewer residents

and there was some suggestion that more affluent households are higher energy users (e.g. Guerin et al. 2000; Anker-Nilssen 2003). These findings largely accord with Australian data on energy and water use in Sydney and surrounding regions collected by the Independent Pricing and Regulatory Tribunal (IPART 2007). That study also found that larger households with higher incomes use more energy, although it is interesting to note that they also found that significant numbers of low-income households were high energy users and *vice versa* for high-income households.

In terms of water conservation, the review also indicated that less affluent households at later life stages with fewer people conserve more water (Aitken et al. 1994; Aitken et al. 1991; De Oliver 1999; Gregory & Di Leo 2003). Australian data from IPART (2007) and Troy et al. (2005) also showed that socio-economic status impacted household water consumption. There was also some suggestion that high water-using households had habits that underpin their water use, for example, doing more washing loads and taking more showers (e.g. Aitken et al. 1994; Gregory & Di Leo 2003).

In contrast to the lack of clarity about the determinants of energy and water use in households, there is a substantial literature that contributes to our understanding of household recycling. Recycling has become a widespread normative practice in the developed world, and in the main, socio-demographic variables do not predict recycling, although there is some suggestion that higher income households recycle more (Hornik et al. 1995; Schultz et al. 1995). A key determinant of recycling is convenience—households recycle more if there is a convenient service such as kerbside collection service (e.g. ABS 2006; Barr & Gilg 2005). Households with more positive attitudes, who perceive more support from important others to engage in recycling and judge that they can easily engage in this action, have stronger recycling intentions that, in turn, predict recycling actions (e.g. Cheung et al. 1999; Terry et al. 1999). The research also suggests that recyclers have more knowledge about recycling and a sense of moral obligation to engage in the practice (Chu & Chiu 2003; De Young 1988; Gamba & Oskamp 1994; Tonglet et al. 2004). To the extent that people develop an identity as a 'recycler', there is a high likelihood of them engaging in identity-consistent behaviour (i.e. recycling) because to do otherwise would create a sense of psychological tension (e.g. Manetti et al. 2004; Terry et al. 1999).

Fielding et al. (2009) also reviewed the scholarly literature on behavioural and technical interventions aimed at changing household water and energy use and waste practices. Again, they concluded that the efficacy of intervention strategies depends on whether the targeted behaviour is waste, water or energy. Past research suggests that sustained energy conservation can be achieved through raising levels of commitment to energy conservation (e.g. Pallak & Cummings 1976), providing goals and frequent feedback (e.g. Abrahamse et al. 2005) and through programs that tailor information to the household situation (e.g. Gonzales et al. 1988) and provide social norms about acceptable behaviour (Nolan et al. 2008). The literature highlights the importance of creating a 'normative climate' (i.e. supportive social norms) that supports energy conservation. The review also highlights the need to tailor interventions to population groups to achieve maximum effectiveness (e.g. Brandon & Lewis 1999). In the Australian context, a program that provided financial and structural strategies to low-income households in South Australia to conserve energy was effective at reducing energy consumption and greenhouse gas emissions (Spoehr et al. 2006).

In terms of water conservation, there is evidence for the effectiveness of technical interventions involving the installation of water-efficient devices, although a question remains about whether householders engage in compensatory behaviour (i.e. using more water) as a result of the presence of the devices (Geller et al. 1983; Wang, Song, Byrne & Yun 1999). The review (Fielding et al. 2009) concluded that the only behavioural interventions that resulted in substantial and sustained household water conservation were prompts that provided information at the point where water is used (Kurz et al. 2005) and programs that promote overall household sustainability such as the EcoTeam Program (Staats et al. 2004). The success of sustainability programs may rest on the creation of a supportive normative climate for household sustainability whereby householders are part of a group of people with similar household sustainability views and practices.

A number of interventions have proven effective for promoting recycling, including commitment strategies that have been shown to increase recycling participation (e.g. Schultz et al. 1995). Commitment strategies arguably increase engagement with recycling. Research conducted by the Australian Bureau of Statistics has also shown that interest in recycling is a key driver of this practice (ABS 2006). Information that raises awareness, communicates normative expectations and provides reminders can also be effective (Hornik et al. 1995; Robinson & Read 2005; Schultz et al. 1995). Although recycling is only one way that households manage their waste, it should be noted that the large majority of research on waste reduction has focused on this strategy. Research examining composting, reuse or minimising consumption has received much less attention in the literature and research suggests that different factors underpin the different waste management practices (e.g. Barr 2007; Ebreo & Vining 2001).

We have provided here an overview of key findings from past scholarly literature on determinants and interventions related to water and energy use and waste reduction. A detailed and comprehensive review of the literature can be found in the Positioning Paper attached to this project (Fielding et al. 2009). The review highlighted a number of shortcomings in the literature. It is clear that few studies on household water and energy conservation or waste reduction have been conducted in Australia and in light of the cultural, climatic and policy differences that exist across developed countries, it is difficult to know whether the findings from past research generalise to the Australian context. Other limitations of the research are that:

1. Many studies do not measure actual energy or water consumption.

2. There is limited research on the psychological determinants of household energy and water conservation.

3. There is no systematic investigation of the effects of household tenure, household composition or household income on household sustainability practices.

4. The research on waste management has focused predominantly on recycling and little attention has been paid to other waste reduction practices.

The current research project helps to address these limitations. The research is a theoretically grounded investigation of the determinants of household water and energy conservation and waste minimisation. Participants reported the specific actions that contribute to energy and water conservation and waste minimisation. Participants were sampled in such a way as to allow an examination of the effect of socio-demographic variables generally, and household tenure, household

composition and household income specifically. The focus in the current research is on waste minimisation rather than recycling. In addition to addressing limitations in past research, the research also aims to identify changes in practices over time and reasons for change. This latter aim can contribute to an understanding of the factors than can help drive positive change in sustainability practices. As noted above, the research also explored householders' reactions to existing and potential future policies aimed at promoting household sustainability. The research was conducted in two capital cities of Australia: Brisbane and Melbourne. We had no a priori expectations of differences in practices across the two sites, although as noted in Section 1.2, the differing environmental contexts of the two cities may impact household energy and water requirements. Our predominant reason for including two cities that differ in their climatic and policy contexts was to investigate whether the findings would generalise across different regions of Australia. The specific research questions addressed by the research project are outlined in Section 1.3 below.

1.2   Environmental context of the research

The two sites for the research, Brisbane and Melbourne differ in their climatic and environmental context. Brisbane is sub-tropical with warm humid summers and mild winters and higher rainfall during summer months, whereas Melbourne is in a temperate climate zone with warm summers and cold winters and higher rainfall during winter months. These climatic differences have implications for household water and energy use. Space and water heating account for the largest proportion of household energy use (>60%, Sandu & Petchey 2009), and ABS (2005) data show higher ownership and use of heaters in temperate states like Victoria than Queensland. Thus, Melbourne households are likely to have higher energy use requirements than Brisbane households. The differences in rainfall across the two climate zones may also differentiate Brisbane and Melbourne in terms of their water end use. For example, ABS (2007) data show that 47.9 per cent of Brisbane households compared to 25.2 per cent of Melbourne households do not water their gardens, relying instead on rainfall alone. This practice may be made more possible in Brisbane because of the reliable summer rainfall and low rainfall during the winter months when it is needed less.

Despite the differences in climatic zones, both Brisbane and Melbourne have recently experienced prolonged drought conditions. Beginning in 1997, Melbourne has experienced its longest drought on record (Melbourne Water, 2010a). Inflows to Melbourne's reservoirs have dropped by 40 per cent over the past twelve years, reaching a low of 25.5 per cent in June 2009. In the time leading up to the survey and interviews (conducted between November 2009 and January 2010), the reservoir levels did not rise above 40 per cent capacity (Melbourne Water, 2010b). Stage 3 water restrictions were introduced to Melbourne in January 2007 and increased to Stage 3a in April of the same year, easing back to Stage 3 in April 2010. Stage 3 restrictions include manual garden watering on specified days, no lawn watering with drinking water, and no car washing with drinking water.

Like Melbourne, Brisbane has recently experienced the worst drought in recorded history. During the drought, reservoir levels fell to record lows of less than 20 per cent. The drought broke in and reservoir levels had risen to just over 70% by the time the research was conducted (Seqwater 2010). Water restrictions have been in place in south-east Queensland since 2005 and reached the highest level (Level 6) by November 2007. Level 6 residential water restrictions allowed only bucket watering of gardens on designated days, no private car washing except

spot cleaning by bucket, no pool filling or topping up, and limited use of water for maintenance of house exteriors and outdoor areas. Permanent water conservation measures were introduced in December 2009 around the time that the survey took place. These measures generally allow irrigation and outdoor house cleaning and car cleaning with efficient devices, and pool filling and topping up provided water efficiency devices are in place around the home. Although both Melbourne and Brisbane have experienced drought conditions leading up to the time of the research, Brisbane's drought had broken by the time of the research and the restrictions had been lifted. Still, the drought and associated measures are recent history for residents of Brisbane and an ongoing issue for Melbourne residents.

1.3   Policy context of the research

A comprehensive examination of the Australian policy context around household sustainability is presented in the Positioning Paper attached to this project (Fielding et al. 2009). We provide a brief overview here, focusing specifically on Queensland and Victoria to set the context for the empirical research. Current policy measures to encourage more environmentally sustainable household practices encompass a combination of approaches, including incentives (e.g. rebates for solar hot water, water tanks), regulation (e.g. mandatory energy ratings on appliances), and persuasive campaigns (e.g. Queensland Water Commission's *Target 140 litres per person per day* campaign).

1.3.1   Water

Water for the future is the Commonwealth's overarching strategy addressing the management of the long-term water supply across Australia. Components of this national framework directed at the household level include the National Rainwater and Greywater Initiative and the Water Efficiency Labelling and Standards scheme (WELS). The former program provides funding to households to install water tanks and greywater systems in order to preserve drinking water, while the latter involves labelling household products for their water efficiency in an effort to assist individuals to choose the most water-efficient products for their homes.

The Queensland Water Commission, the lead agency for water conservation in Queensland, was established in 2006 in response to increasing concerns about the impact of climate change, and in particular the drought conditions experienced in south-east Queensland. In relation to household water use, the Commission in conjunction with local governments (e.g. Brisbane City Council) is responsible for improving water-use efficiency through the imposition of water restrictions and water efficiency programs. The Queensland government has implemented a Climate Smart Home Service aimed at reducing household greenhouse gas emissions which includes providing households with a customised energy and water efficiency management plan. This program follows on from the Home WaterWise Service that provided advice and installation and rebates for water-efficient devices to improve household water efficiency. Rebates were offered for rainwater tanks, dual-flush toilets, water-saving showerheads, water-efficient washing machines, water-saving gardening devices and so on. In addition, campaigns providing targets for per person water use (e.g. Target 140, Target 170) have been a central demand management platform. This initiative was accompanied by a range of water-saving information promoting improved household water efficiency. Permanent water conservation measures were introduced across south-east Queensland in December 2009.

Sustainability Victoria has responsibility for enacting the state's policy in relation to water conservation, with Melbourne residents provided water billing and water-related information through one of three water utilities. Victoria has in place a similar initiative to Queensland's 'Home WaterWise Service' labelled 'WaterWise' that offers households a free water audit and repair or replacement of inefficient water fittings. WaterWise is a joint initiative between the Department of Human Services and local water corporations. Rebates are offered for water-efficient appliances such as rainwater tanks, greywater systems, dual-flush toilets and low-flow showerheads. The Victorian government has also run campaigns providing per person water use targets (e.g. Target 155) accompanied by water restrictions and water saving advice.

1.3.2 Energy

In terms of energy efficiency, a number of Commonwealth programs have been established to support energy efficiency at the household level, including rebates (Insulation rebate; Photovoltaic Rebate Program; Solar and Heat Pump Hot Water System Rebate); loans (Green Loans Program), trials (Solar Cities Program); joint initiatives (Energy Star); schemes (Nationwide House Energy Rating Scheme) and initiatives targeting remote or off-grid areas (Renewable Remote Power Generation Program). Management of domestic appliance energy performance is being monitored through the National Appliance and Equipment Energy Efficiency Program (NAEEEP) with the use of energy rating labels and minimum energy performance standards. This program is being progressively introduced to all states and territories.

The Queensland government has branded its strategy aimed at household energy efficiency as 'Climate Smart Living' <http://www.climatesmart.qld.gov.au/>. As part of this promotion, householders can purchase for a small fee, an energy audit conducted by a qualified tradesperson who can provide advice and install various energy-saving devices such as a household energy monitor, a water-efficient showerhead, and compact fluorescent light globes. Aside from Commonwealth programs and rebates, Queensland provides rebates for installing gas hot water systems and gas appliances.

Victoria provides a range of programs and information to the householder to assist households to reduce their energy use. Sustainability Victoria's website <http://www.resourcesmart.vic.gov.au/for_households/energy.html> offers a range of information on sustainable solutions in the home, rebate programs and other initiatives directed at the householder. These initiatives include Green Power, tools to measure household energy and water use, and the Resource Smart Retail Program whereby households can access an accredited assessor who will conduct an audit and provide advice.

1.3.3 Waste

Government policy relating to waste management essentially aims to promote the reduction of the amount of waste sent to landfill and encourage recycling, reuse or reduction of the waste that is generated. New waste minimisation strategies have been introduced by most states and territories. While these strategies are diverse, most have a similar objective of 'zero waste' to landfill, and adopt quite stringent landfill diversion targets.

Key strategies underpinning the state and territory policy frameworks include similar features such as the:

→ Setting of targets such as reduction in the diversion of waste from landfill or overall waste generation.

→ Introduction of landfill levies.

→ Introduction of a range of product-specific programs addressing various household waste streams (chemicals, paints and rechargeable batteries).

Queensland is developing a new waste strategy that aims to reduce the amount of waste generated and increase resource recovery rates. Local governments in Queensland provide kerbside collection services to 99.6 per cent of the state's population (EPA 2008). The Brisbane City Council's waste minimisation strategy *Towards Zero Waste* operates on the principles of the waste management hierarchy that moves from avoiding buying unneeded products, reducing consumption, reuse and recycling, and disposal as the final option. In addition to providing information to raise awareness about waste minimisation and kerbside recycling services, deposits of specialised waste (e.g. e-waste) at transfer stations is provided.

Victoria is in its fourth year of the ten-year *Towards Zero Waste* strategy, the state's primary initiative for addressing waste management issues. The key focus is on minimising waste, maximising recovery and reducing environmental impacts resulting from waste generation. The strategy is governed by the *Environmental Protection Act* (1970). The Victorian best practice kerbside system promotes the option for a three-bin system that includes kerbside collection of recyclables, organics and residuals. Currently the organics kerbside collection is optional; however, it is envisaged that as waste collection and disposal contracts are renewed, most metropolitan councils will take up the best practice system. Currently all outer suburban councils in Victoria provide the three-bin option to households, while inner urban councils provide the two-bin option primarily due to access restrictions and home storage issues.

1.4 Research questions

This project has four aims:

1. to understand householder waste, water and energy (henceforth 'waste/water/energy') attitudes and practices and key influences on these

2. to understand changes in these attitudes and practices over time and the drivers of change

3. to identify and assess strategies for effecting positive changes in household waste/water/energy

4. to understand the influence of socio-economic status, household tenure and household type on these issues.

These broad aims will be addressed with research speaking to the following specific questions.

1. What are Australian householders' waste/water/energy attitudes and practices?

2. Are there differences in these across socio-economic groups and according to tenure (owners vs. renters) and household type (e.g. single person vs. couple with children)?

3. How have waste/water/energy attitudes and practices changed over time?

4. What factors have driven changes in household waste/water/energy attitudes and practices?

5. What is the relationship between householders' waste/water/energy attitudes and practices (i.e. behaviour) and does this relationship vary according to Socio-economic Status (SES), household type, tenure or behavioural domain?

6. What are the most effective ways of shaping positive change in household waste/water/energy perceptions and behaviour and what are the costs and benefits of these approaches for stakeholders?

1.5 Structure of the report

To investigate the research questions, a quantitative survey and qualitative interviews were conducted. In Chapter 1 we outline the theoretical framework that guides the research, that is, an expanded Theory of Planned Behaviour (TPB) model, provide a definition of curtailment and efficiency actions, and outline the methodology for the survey and interviews. Chapter 2 reports the demographics of the sample, outlines the analytical approach, and reports preliminary analyses, including overall means for the TPBvariables on water and energy conservation and waste minimisation. The quantitative and qualitative results for water conservation, energy conservation and waste minimisation are reported in Chapters 3, 4 and 5, respectively. Chapter 6 reports the quantitative and qualitative results relating to policy acceptance. In Chapter 7 a summary of the main findings is provided and implications of the findings for policy are discussed.

1.6 The theoretical framework

The present research is framed by the TPB (Ajzen 1991), a well-established and extensively tested decision-making model that identifies key influences on intentions and behaviour. Past reviews and meta-analyses have established that here is widespread support for the basic TPB model (Albarracin et al. 2001; Armitage & Conner 2001; Blue 1995; Godin & Kok 1996; Hagger et al. 2002). The TPB has a well-established methodology that allows accurate measurement of attitudinal and behavioural variables and the beliefs that underpin these. The elicitation of beliefs about the costs and benefits, barriers and salient influence sources (i.e. referents) that relate to waste/water/energy practices provides concrete information for policy makers striving to develop strategies to positively influence these practices. Note that the TPB has been successfully utilised to develop policy interventions relating to public health issues (e.g. Albarracin et al. 2001). Moreover, the parsimonious nature of the theory ensures scope to extend the model through the inclusion of additional factors to improve its explanatory power and to develop a comprehensive understanding of waste/water/energy attitudes and practices.

According to the TPB, the most immediate predictor of a person's behaviour is his or her intentions to engage in the behaviour (see Figure 1). The theory argues that our intentions are in turn determined by three main factors: attitudes, subjective norms and perceived behavioural control. Attitudes refer to the overall positive or negative evaluation of performing the behaviour. Subjective norms are based on peoples' perceptions of whether important others in their life would want them to perform the behaviour, and perceived behavioural control reflects the extent to which people think that the behaviour is something that they can voluntarily do. Thus, to the extent that individuals hold positive attitudes toward a behaviour, for example, water conservation, think that there is support from important others for water conservation, and perceive that they can easily engage

in actions to conserve water, they should have strong intentions to engage in water conservation actions.

According to the TPB, our attitudes, subjective norms, and perceptions of control are underpinned by sets of beliefs (see Figure 1). For example, our attitudes are formed via an expectancy value analysis whereby our beliefs that the behaviour will be associated with an outcome (behavioural beliefs) are weighted by an evaluation of the outcomes (outcome evaluations). As an example, if we believe that conserving water will save money and we value saving money, then our attitudes toward water conservation should be positive. Of course, a full consideration of all the important costs and benefits feed into the final attitude. Our perceptions of normative support (i.e. subjective norms) are thought to be a function of how much we perceive other referents (e.g. family, environmentalists, government) think we should perform the behaviour (normative beliefs) weighted by our motivation to comply with the referents (motivation to comply). Finally, perceptions of behavioural control are proposed to be underpinned by our beliefs about the factors that facilitate or act as barriers to performing the behaviour (control beliefs) weighted by the expected impact that these factors would have if they were to be present (perceived power).

Figure 1: Theory of Planned Behaviour model
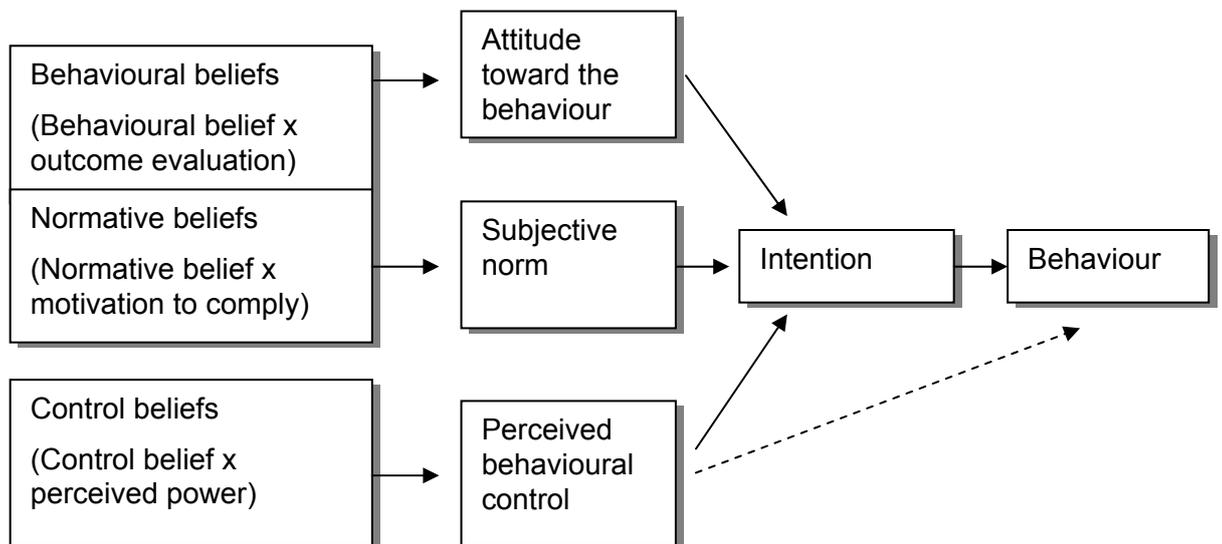
The parsimonious nature of the TPB means that it can be expanded to include factors that may help increase the explanatory power of the model in specific behavioural contexts. The review of literature by Fielding and colleagues (2009) and past research utilising the TPB (e.g. Conner & Armitage 1998; Ouellette & Wood 1998) suggests that habits may be an important predictor of sustainability practices. For example, research has shown that habits relating to water consumption (see Russell & Fielding 2010) and recycling (e.g. Carrus et al. 2008; Cheung et al. 1999; Knussen & Yule 2008; Knussen et al. 2004; Terry et al. 1999) influence the extent to which people engage in these behaviours. In the present study habits are conceptualised as the extent of past engagement in household waste/water/energy practices.

In addition to past behaviour, the TPB model is also extended to incorporate a measure of household culture and descriptive norms. Household culture is conceptualised as the extent to which a household has an environmentally sustainable identity and that that there is agreement about the importance of

environmental sustainability in the household. Theory and research suggests that when people identify themselves in particular ways (e.g. as a recycler, a water conserver, etc.), that the identity is internalised and guides behaviour. Consistent with this, when identity, for example, as a recycler, green consumer or environmental activist has been added to the TPB, identity improves the predictive power of the model and emerges as a significant predictor of intentions (e.g. Fielding et al. 2008; Mannetti et al. 2004; Sparks & Shepherd 1992). The addition of household culture aims to tap into the extent that household dynamics, in the form of identity and culture, play in household sustainability. A measure of descriptive norms is also added to the model. Descriptive norms describe typical or normal behaviour—what people actually do as opposed to what they ought to do (Cialdini et al. 1990). Cialdini and colleagues (1990) argue that descriptive norms motivate behaviour because they provide information about what is adaptive and effective in a given situation. Finally, demographic variables will also be included in the model to explore their contribution. The expanded TPB model is shown in Figure 2.

Figure 2: Expanded theory of planned behaviour model
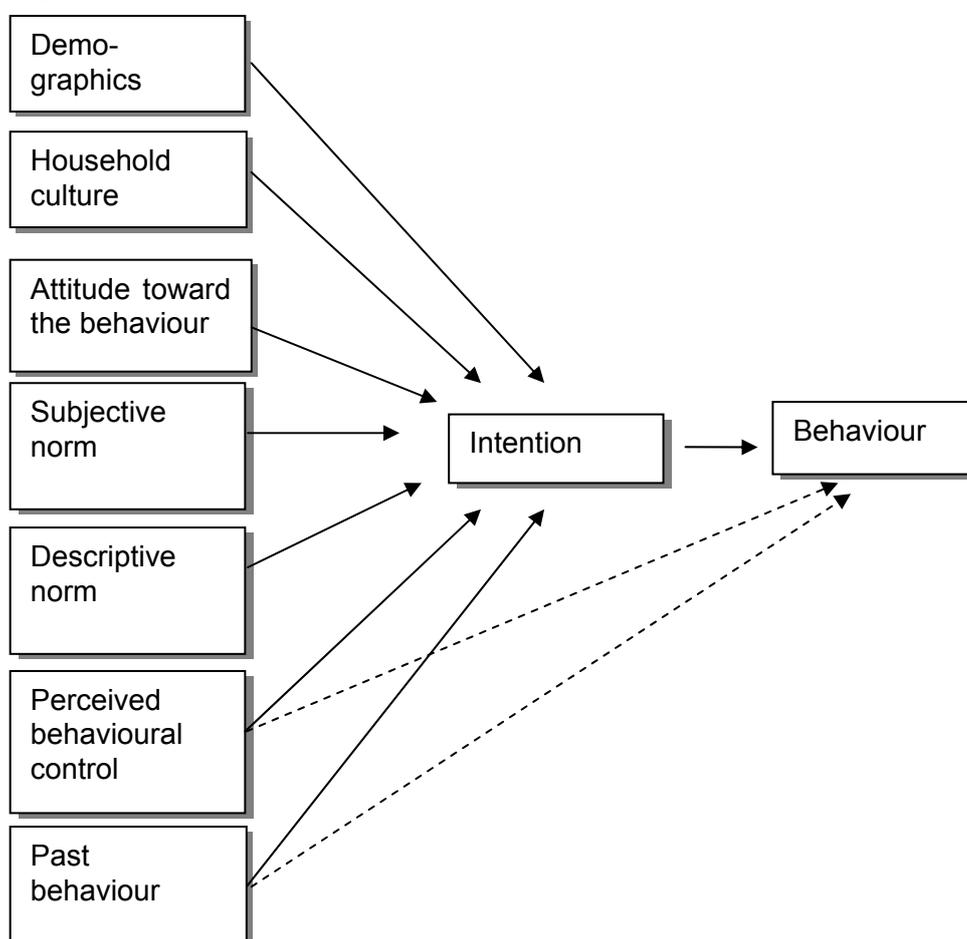
1.7   Household sustainability actions: curtailment vs. efficiency actions

One important distinction that is made in the environmental psychology literature is between everyday actions and the installation of efficiency devices (Gardner & Stern 1996). These are termed:

→ *Curtailment actions.* That is, everyday behaviours that help to conserve resources. Examples include turning off lights or only doing full loads of washing.

→ *Efficiency actions.* That is, one-off installation of devices that enable ongoing resource conservation. Examples are installing energy-efficient lighting or a water-efficient washing machine.

Past research has shown that curtailment and efficiency actions are underpinned by a different set of determinants (e.g. Russell & Fielding 2010). This theoretical and empirical distinction between the two types of sustainability actions clearly indicates that a full and comprehensive analysis of household sustainability practices requires an investigation of both curtailment and efficiency actions. For this reason, two versions of the quantitative survey were developed: one that assessed TPB variables in relation to water and energy curtailment (the distinction between curtailment and efficiency is not applicable to waste minimisation) and one that assessed TPB variables in relation to water and energy efficiency. Note that in both versions of the survey participants were asked about their past behaviour in relation to both curtailment and efficiency actions. The decision to administer two versions of the survey was a practical one; the inclusion of questions about energy and water curtailment and efficiency made the survey too long. An overly long survey could have increased participant attrition and fatigue and thus reduced the quality of the data.

1.8 Quantitative survey: participants and procedure

In total, 1194 participants took part in the quantitative survey, 593 from Melbourne and 601 from Brisbane. The sample is described in detail in Chapter 3. Participants were members of a national online survey panel who had agreed to take part in research and who received a small reward (e.g. $2) for research participation. An advantage of recruiting through this type of panel is that it reduces the likelihood of a sample biased in terms of the topic, that is, people who have strong views about the research topic are more likely to take part.

Panel members in Brisbane and Melbourne were sent an email invitation to take part in the research. The study was presented as research conducted by The University of Queensland (UQ) about household environmental sustainability. Participants were told that the initial survey would take approximately twenty minutes to complete and that all their information would be completely confidential and only used for the purpose of the survey. Those panel members who signed up for the study were presented with information about the study. It was made clear that completion of the survey required them to provide information from their most recent water and energy bills. Note that although this information was included in an effort to collect objective measures of energy and water use, inspection of the data suggested that there was too much inaccuracy in the data (due to both a flaw in the online program as well as respondents guessing or entering incorrect data) for it to be used in the analyses. The information page also provided information about ethical considerations such as privacy of the data, contact details of the researchers should there be any concerns about the study, the right to withdraw at any time, contact details of the UQ ethics officer, how to find out more information about the study, and the amount of payment for taking part. In addition, as the data from the survey will be archived with the Australian Social Science Data Archive (ASSDA), participants were given information about this process. Participants were presented with a consent form that allowed them

to indicate whether they understood all aspects of the study and agreed to take part and whether they agreed to their data being archived with ASSDA.

On completion of the survey, participants were informed that there would be further research involving interviews about household sustainability. They were asked to indicate if they did not want to take part in the interviews. Those participants who indicated that they did not want to take part were not considered in the recruitment for the qualitative interviews.

1.9 Quantitative online survey

The survey, conducted in November 2009, assessed variables of the expanded TPB model in relation to water conservation, energy conservation and waste reduction (in that order). Participants randomly received one of two versions of the survey: a curtailment or an efficiency version. In addition to assessing the variables of the expanded TPB model, the survey also asked about the acceptability and fairness of a range of policies aimed at promoting household sustainability, whether their energy use, water use and amount of waste produced had changed over the past three years and the reasons for the change or lack of change.

1.9.1 Conceptualising water and energy conservation and waste reduction

As noted above, participants responded to either a curtailment or efficiency version of the survey. Prior to responding to each set of TPB questions, participants were provided with a list of curtailment or efficiency actions for water and energy. All participants were presented with the same set of waste reduction actions. The actions presented to respondents are listed at the beginning of each of the appropriate empirical chapters (i.e. a list of water curtailment and efficiency actions can be found at the beginning of Chapter 3).

1.9.2 Theory of planned behaviour questions

Participants were first asked about water conservation. Following the presentation of the list of curtailment or efficiency actions, they were asked about their attitudes, subjective norms, perceived behaviour control and intentions in relation to saving water in the ways listed. Note that the questions are standard measures of the TPB variables, although we have used single rather than multiple items to measure each construct. The use of single-item measures, while not ideal, was necessitated by the need to reduce the length of the survey and this approach has been used in previous research framed by TPB (Harland et al. 1999).

Table 1: Theory of planned behaviour variables

Construct	Questions
Attitude	I think reducing [water/energy/waste] around the home in the ways listed above is: (1 extremely bad – 7 extremely good)
Subjective norm	I believe that people who are important to me want me to reduce [water/energy/waste] around the house in the ways listed above (1 strongly disagree – 7 strongly agree)
Perceived behavioural control	Self-efficacy: I am confident I could reduce [water/energy/waste] in the ways listed above if I wanted to (1 strongly disagree – 7 strongly agree)
	Perceptions of control: Whether I reduce

	[water/energy/waste] around the house in the ways listed above is entirely up to me (1 strongly disagree – 7 strongly agree)
Descriptive norm	People in my community (1 never reduce [water/energy/waste] around the house – 7 Always reduce [water/energy/waste] around the house)
Intentions	I expect I will reduce [water/energy/waste] around the home in the ways list above in the next six months

In accordance with Ajzen's (1991) conceptualisation of perceived behavioural control, perceptions of control (i.e. whether one can easily engage in a behaviour) and self-efficacy (i.e. whether one has the skills to undertake the behaviour) have been measured. In addition to the standard TPB questions, descriptive norms (i.e. perceptions of what others in the community do in relation to saving water) were also assessed. The TPB questions are shown in Table 1 above.

1.9.3 Self-reported past behaviour

Following the TPB questions, all participants, regardless of the version of survey they completed, reported their household engagement in curtailment actions and efficiency actions. Thus, in the section on water conservation, participants indicated on a scale (1 never, 2 rarely, 3 sometimes, 4 almost always, 5 always, 6 not applicable) whether they engaged in each of the water curtailment actions. They also indicated whether they would install each of the efficiency devices (1 definitely will not install, 5 definitely will install, 6 already installed, 7 not applicable). Similarly, in the energy conservation section participants indicated the extent to which their household engages in the energy curtailment actions and whether they had or intended to install the energy-efficient devices. Finally, in the waste reduction section participants indicated whether their household engages in each of the waste reduction actions. The data gathered through responses to the efficiency questions allowed us to establish the extent of energy and water efficiency infrastructure that homes already had in place.

1.9.4 Household culture

Following the TPB and self-reported behaviour questions, participants were asked a series of questions assessing household culture (see Table 2). Four questions assessed this construct with responses made on a scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Table 2: Questions assessing household identity

Household identity questions
We think of ourselves as an environmentally sustainable household
Environmental sustainability is important in our household
There is agreement among members of the household that taking action to make the home environmentally sustainable is an important thing to do
Household members agree that taking actions to make your household sustainable is an effective way of addressing environmental problems

Note: Responses to each question were on a scale ranging from 1 strongly disagree to 7 strongly agree.

1.9.5 Support for and perceived fairness of household sustainability policies

Participants were then presented with a range of strategies aimed at encouraging households to be more environmentally sustainable and they were asked to indicate the extent to which they supported each of the strategies. The list of strategies can be found in Chapter 6 on policy findings. Responses were made on a 5-point scale (1 strongly oppose – 5 strongly support). The same set of strategies were presented to participants and they were asked how fair each of the strategies is to the average Australian family (1 very unfair – 5 very fair). Finally, the same set of strategies was presented to participants and they were asked to click on any they thought were unfair to vulnerable groups in Australia (e.g. elderly, low-income families).

1.9.6 Reported water and energy use

At the beginning of the survey participants had been informed that they would need access to their water and energy bills to complete the survey. Note that they were also assured of the confidentiality of any information they provided. They were then asked to report (from their bill) their average daily usage for the most recent quarter, their average daily usage for the previous quarter and their average daily usage for the same period last year. This was asked in relation to water use (in litres), electricity use (in kilowatt hours), and if applicable, gas use (in megajoules). Please note that because of inaccuracy in the data, it was not used in subsequent analyses. Issues relating to the lack of objective data are discussed in the limitations of the research section in Chapter 7.

1.9.7 Changes in water and energy use and waste generation

Participants were then asked whether their household water use has increased or decreased over the past three years (1 decreased a lot, 2 decreased a little, 3 stayed the same, 4 increased a little, 5 increased a lot, 6 don't know). Participants who said their water use had increased or decreased were provided with a list of reasons and asked to choose the three most important factors that were responsible for the change in usage. Respondents who said their usage had stayed the same were provided with a similar list; however, the wording was changed slightly (e.g. no mention of 'changes') and one of the reasons was not included (i.e. change to the home and garden). The list of reasons can be found in Tables 16 and 17 in Chapters 3.

The same question was asked about energy use, and again, those who indicated their usage had changed chose the three most important factors for the change from a list (see Tables 28 and 29) and those who had stayed the same were presented with a similar list. Finally, the same question was asked about the amount of waste that the household produces that cannot be recycled and participants chose from a list the three most important factors for the change with those who had not changed presented with a similar list (see Tables 33 and 34). In all cases, participants were presented with an 'other' option so that they could add additional reasons.

1.9.8 Demographic variables

The survey concluded by asking participants for demographic information. They were asked their age, gender, household tenure, dwelling type, gross household annual income, how many people live in the home including the ages of the children, usual occupation, highest level of education, number of bedrooms in the house and size of the garden. The demographic variables and response options

are shown in Table 3. An overall summary of the variables measured in the survey can be found in Table 4.

1.9.9 Scale construction

Where applicable, questionnaire items were combined to form scales. Although it was expected that the two items measuring perceived behavioural control (i.e. self-efficacy and control) would correlate and be combined into a scale, the correlations were low for water conservation ($r = 0.32$), energy conservation ($r = 0.44$), and waste minimisation ($r = 0.44$). For this reason a perceived behavioural control scale was not created, and instead, the questions are treated as separate measures of self-efficacy and perceptions of control. The lack of correlation between these two items may be due to the behavioural context or it may be due to using single-item measures.

Scales were created to assess household culture, past water, energy and waste curtailment actions, the number of indoor and outdoor water-efficient appliances installed and the number of energy-efficient appliances installed. See Appendix A for details of how these scales were created. Table 4 provides a summary of the variables measured in the survey.

Table 3: Demographic variables and response options

Demographic variable	Response option
Age	Year of birth
Gender	Male/female
Household tenure	Own home with mortgage
	Own home with no mortgage
	Rent from private landlord
	Rent from public landlord
	Other
Type of dwelling	Free-standing house
	Semi-detached townhouse/villa
	Unit or flat in building
	Other
Gross household annual income	Up to $31 200
	$31 201–$52 000
	$52 001–$78 000
	$78 001–$104 000
	More than $104 001
	Prefer not to respond
No. of people in house	No. of adults and no. of children (+ ages of children)
Usual occupation	Open-ended
Highest level of education	Primary school
	Secondary school
	Trade/TAFE
	Undergraduate university
	Postgraduate university
No. of bedrooms in house	1, 2, 3, 4, 5 or more
Size of garden	Small

	Medium
	Large
	No garden

Table 4: Summary of the variables measured in the survey

Variable	No. of items	Response format
Attitudes to water curtailment or efficiency actions	1	7-point scale
Attitudes to energy curtailment or efficiency actions	1	7-point scale
Attitudes to waste minimisation actions	1	7-point scale
Subjective norms relating to water curtailment or efficiency actions	1	7-point scale
Subjective norms relating to energy curtailment or efficiency actions	1	7-point scale
Subjective norms relating to waste minimisation actions	1	7-point scale
Perceptions of control relating to water curtailment or efficiency actions	1	7-point scale
Self-efficacy relating to water curtailment or efficiency actions	1	7-point scale
Perceptions of control relating to energy curtailment or efficiency actions	1	7-point scale
Self-efficacy relating to energy curtailment or efficiency actions	1	
Perceptions of control relating to waste minimisation actions	1	7-point scale
Self-efficacy relating to waste minimisation actions	1	
Descriptive norms relating to water curtailment or efficiency actions	1	7-point scale
Descriptive norms relating to energy curtailment or efficiency actions	1	7-point scale
Descriptive norms relating to waste minimisation actions	1	7-point scale
Intentions to engage in water curtailment or efficiency actions	1	7-point scale
Intentions to engage in energy curtailment or efficiency actions	1	7-point scale
Intentions to engage in waste minimisation actions	1	7-point scale
Past water curtailment actions	9	5-point scale
(used separately or combined into a water curtailment scale)		N/A option
Water efficiency intentions	9	5-point scale
Inside water efficiency index	5	0–5
Outside water efficiency index	4	0–4
Past energy curtailment actions	8	5-point scale
(used separately or combined into a energy curtailment scale)		N/A option
Energy efficiency index	6	0 - 6
Past waste minimisation actions	9	5-point scale
(used separately or combined into a waste minimisation scale)		N/A option
Household culture	4	7-point scale
Support for household sustainability policies	13 policies	5-point scale
Perceived fairness to average Australian family of household sustainability policies	13 policies	5-point scale
Perceived fairness to vulnerable groups in Australia of household sustainability policies	13 policies	Choose all that are unfair

Variable	No. of items	Response format
Reported change in water use	1	5-point scale
Reasons for change or lack of change	10 reasons	Choose most important 3
Reported change in energy use	1	5-point scale
Reasons for change or lack of change	9 reasons	Choose most important 3
Reported change in amount of recyclable materials	1	5-point scale
Reasons for change or lack of change	7 reasons	Choose most important 3
Demographic variables	10	See Table x

1.10 Qualitative interviews: participants and procedure

At the end of the quantitative survey participants were informed that further research was being conducted; specifically interviews that would last one hour and for which participants would receive a gift voucher. Participants for the interviews were drawn from the pool of survey participants who indicated that they would be interested in taking part in the interviews.

The sampling strategy for the interviews was to recruit households who varied in household income (low, medium, high) and household composition (single, multiple adult vs. families with children). Where possible we also sought to include households who were in public housing to ensure some representation from this sector. Although we aimed to interview twelve households in Melbourne and twelve in Brisbane, because of attrition the final sample comprised eleven households in Brisbane and eleven in Melbourne (n=22 interviews).

Eligible households were contacted by phone to ask if they would be interested in taking part in an interview about household sustainability. They were informed that the interviews would be conducted in their home with all adults in the household present (e.g. husband and wife) and that the interviews would take approximately one hour. The timing was largely at the convenience of the householders. Participants were offered a $70 gift voucher as a token of appreciation for their time. Interviews were conducted over the period of December 2009 and January 2010. All interviews were conducted by the same female interviewer. At the beginning of the interview an information sheet was presented that covered details of the study and the ethical considerations associated with the research (e.g. the right for participants to withdraw from the research at any time without penalty). Participants were informed that the interviews would be recorded for the purposes of transcribing and analysing the data. Participants then signed a consent form if they agreed to be part of the research (all participants agreed). On completion of the interview participants were provided with the gift voucher for their participation.

1.10.1 Interview schedule

The interview questions were designed to elicit salient beliefs relating to household water and energy use and waste management as per the TPB methodological framework. Additional questions were included to qualitatively explore responses to household sustainability policy and perceptions of change to household sustainability practices. Note that at the beginning of the interview participants were informed that when we used the term 'sustainability' we were referring to energy and water use and waste management in the home.

The interviewer began by presenting participants with a list of water curtailment and efficiency actions (the same as those presented in the survey). Participants were asked to talk about the advantages and disadvantages of engaging in these types of actions, whether there are any groups or individuals who approve or disapprove of these types of actions and what factors or circumstances would make it easy or difficult to engage in these actions. They were also asked if there are any other things that they do or appliances that they use to save water. Participants were also presented with a list of the energy curtailment and efficiency actions (as per survey) and waste minimisation actions (as per survey) and the same questions were asked about these actions.

Participants were then asked whether they had changed the way they use water or energy or manage waste over the past three years and the reasons for these

changes. They were then presented with the list of policies that can help promote household sustainability (the same list that was presented in the survey) and asked which policies are acceptable, fair and effective. An outline of the interview questions is listed in Table 5.

Table 5: Summary of interview questions

Interview questions
Advantages and disadvantages of water and energy curtailment and efficiency actions and waste minimisation actions
Groups or individuals who would approve or disapprove of water and energy curtailment and efficiency actions and waste minimisation actions
Facilitators of and barriers to water and energy curtailment and efficiency actions and waste minimisation actions
Other actions that help the household be sustainable
Changes to water use, energy use, waste management over the past three years and reasons for changes
What policies government should be putting in place to make households more sustainable: support, fairness, effectiveness of the policies

2 PARTICIPANTS AND PRELIMINARY ANALYSES

2.1 Survey participants

In total there were 601 Brisbane householders who responded to the survey and 593 Melbourne householders. Of the Brisbane respondents, 297 completed the curtailment version of the survey and 304 completed the efficiency version. Of the Melbourne respondents, 301 completed the curtailment version and 292 completed the efficiency version.

Table 6 displays the demographics of the Brisbane and Melbourne samples. As the table shows, respondents ranged in age from 18 to 88; the gender ratio was approximately even, although there were more men than women. Respondents were predominantly home owners who lived in free-standing houses, although between 27 and 31 per cent rented from private or public landlords and between 18 and 26 per cent lived in semi-detached housing or units. Households were fairly evenly spread across the household income levels and most commonly, respondents had secondary school, Trade/TAFE, or undergraduate tertiary as the highest level of education. The majority of households had two adults and no children. The majority of homes had three or four bedrooms, and a medium garden size was most common.

Table 6: Demographics of Brisbane and Melbourne respondents

Demographics	*Brisbane respondents*		*Melbourne respondents*	
Age	Mean	48.75	Mean	47.68
	Range	18–83	Range	18–88
Gender	Male	50.4%	Male	54.6%
	Female	49.6%	Female	45.4%
Household tenure	Own home w/ mortgage	38.9%	Own home w/ mortgage	38.3%
	Own home no mortgage	28.0%	Own home no mortgage	33.7%
	Private landlord	22.85	Private landlord	19.9%
	Public landlord	7.7%	Public landlord	6.6%
	Other	2.7%	Other	1.5%
Type of dwelling	Free-standing house	81.9%	Free-standing house	74.0%
	Semi-detached townhouse/villa	6.8%	Semi-detached townhouse/villa	9.9%
	Unit or flat	11.0%	Unit or flat	15.7%
	Other	0.3%	Other	0.3%
Household annual income	Up to $31 200	15.6%	Up to $31 200	16.9%
	$31 201–52 000	20.0%	$31 201–52 000	18.4%
	$52 001–78 000	18.3%	$52 001–78 000	19.6%
	$78 001–104 000	18.0%	$78 001–104 000	17.4%
	More than $104 000	16.1%	More than $104 000	11.8%
	Prefer not to respond	12.0%	Prefer not to respond	16.0%
Number adults in house	Mean	2.2	Mean	2.23
	Range	1–10	Range	4–6

Demographics	Brisbane respondents		Melbourne respondents	
Number of children in house	Mean	0.63	Mean	0.59
	Range	0–8	Range	0–5
Highest level of education	Primary school	2.3%	Primary school	0.7%
	Secondary school	35.3%	Secondary school	32.4%
	Trade/TAFE	34.1%	Trade/TAFE	29.0%
	Undergraduate tertiary	17.8%	Undergraduate tertiary	23.1%
	Postgraduate tertiary	10.55	Postgraduate tertiary	14.8%
Number of bedrooms in dwelling	1	2.7%	1	4.6%
	2	13.0%	2	16.2%
	3	42.4%	3	48.4%
	4	34.6%	4	25.3%
	5 or more	7.3%	5 or more	5.6%
Size of garden	Small	27.1%	Small	24.5%
	Medium	40.1%	Medium	46.5%
	Large	25.3%	Large	23.8%
	No garden	7.5%	No garden	5.2%

2.2   Interview participants

Eleven households participated in interviews in Brisbane and Melbourne, resulting in a final sample of twenty-two households. The following table gives a breakdown of the participants' socio-demographics. A further breakdown of participants includes three single-parent families in Brisbane and two in Melbourne. Of the singles and couples, three singles and three couples were interviewed in Brisbane and three couples, one single and one mother and daughter household participated in the Melbourne interviews. After several declines from a small sample pool, only one public housing household participated in the Brisbane interviews while three public housing households were interviewed in Melbourne.

Participants were selected from the list of survey participants who had indicated they would be interested in being followed up for an interview. From this list participants were selected based on three socio-demographic criteria: tenure, income and household type. Participants were contacted by phone and invited to participate in an interview. If they accepted, a time and date was scheduled and if they declined the next person from the survey list who matched the relevant socio-demographic criteria was selected and contacted.

Households were located in the inner city, inner and outer suburban and in rural and rural acreage settings of Brisbane and Melbourne, up to a radius of 40 kilometres from the city centre. Households included inner city apartments, inner city and rural public housing units and detached houses.

All significant adults of the households participated in the interviews where possible. On two occasions children sat in on the interview or joined in the interview part way through.

Interviews took place in the participants' homes and ran for between thirty minutes and one and a half hours, with most taking between forty-five minutes and one hour. The interviews were digitally recorded, professionally transcribed and analysed thematically using Nvivo.

Table 7: Socio-demographic breakdown of interview participants

		Brisbane	*Melbourne*
Tenure	Owners	5	6
	Renters	6	5
Household type	Single/couple	6	5
	Family	5	6
Socio-economic status	Low	5	4
	Middle	2	3
	High	4	4

2.3   Preliminary survey analyses

2.3.1 Demographic comparisons of Brisbane and Melbourne

To investigate whether there were systematic differences between Brisbane and Melbourne respondents, analyses were conducted comparing the two groups on the socio-demographic variables. Because of the number of analyses being conducted, and the concomitant increased risk of Type 1 error, a probability level of $P < 0.01$ was adopted for the analyses. A summary of the findings can be found in Appendix B. The only significant differences to emerge between Brisbane and Melbourne respondents was in terms of education level, dwelling type and number of bedrooms in the house. The results show that a greater proportion of Melbourne respondents had undergraduate and postgraduate education than Brisbane respondents; a greater proportion of Brisbane respondents live in free-standing houses, whereas a greater proportion of Melbourne respondents lived in townhouses or units; and the average number of bedrooms was higher in the houses of Brisbane respondents than Melbourne respondents.

2.3.2 Comparison across survey type

Although respondents were randomly assigned to complete either the curtailment or the efficiency version of the survey, analyses were conducted to ensure that there were no systematic demographic differences between the respondents who answered each version of the survey. Results of the analyses show that there was no evidence of systematic differences between the respondents who completed each version of the survey. The full results of the analyses can be found in Appendix C.

2.4   Overview of analytic approach

In addition to the preliminary analyses reported above, in this chapter overall means for the TPB variables are reported for water use, energy use, and waste minimisation. Differences between means are tested with one-way analysis of variance (ANOVA).

As outlined in Chapter 1, water conservation results are reported in Chapter 3, energy conservation results in Chapter 4, waste minimisation results in Chapter 5, and policy results in Chapter 6. Chapters 3 to 5 are structured in the following

way: levels of engagement in each of the practices are reported and differences in levels of engagement are tested across tenure, household composition and household income levels. Multiple regression analyses are conducted to identify the key predictors of intentions and past behaviour for each household sustainability practice. Interview data is drawn on to identify the beliefs that underpin the key predictors of intentions (e.g. attitudes, control perceptions). Drawing on survey and interview data, reported changes in practices are described and again, differences across tenure, household composition and household income are tested. The reasons for changes in household practices are also described. In the policy chapter (Chapter 6), survey and interview data relating to levels of support, perceived fairness to Australians and to vulnerable groups, of each of the policies are reported. For the survey data, differences in support and perceived fairness across tenure, household composition and household income groups are tested.

In relation to the quantitative survey data, the data is analysed and reported in three ways (see below). Results of the interviews are reported and integrated with the survey data in the appropriate chapters. It is important to note that overall, there was a high level of consistency in the findings across the survey and interview data.

2.4.1 Descriptive statistics

In each of the empirical chapters (3 to 6) means and percentages are reported to provide a picture of the overall levels of attitudes and behaviour, and in relation to policy, support and perceived fairness.

2.4.2 Demographic comparisons

A major aim of the research was to examine whether there were differences in the attitudes and actions of households who varied in their tenure, composition and income levels. We focused on these demographic comparisons for two key reasons: first, there is little research systematically examining the effects of these variables on a range of household sustainability actions and therefore our research can make an important contribution to the literature in this area. Second, and most importantly, gaining an understanding of the potential impact of these variables provides important information to policy makers. If differences arise, then the findings highlight the necessity to develop sustainability policies that are tailored to the different demographic groups. To facilitate the demographic comparisons, the questions that elicited tenure, household composition and household income were recoded into the following categories.

→ *Tenure.* Respondents who owned a home (with or without a mortgage) were coded as owners and respondents who rented from a public or private landlord were coded as renters.

→ *Household composition.* One adult households were coded as single person households, households with two or more adults were coded as multiple person households and households that contained one or more adults and children were coded as family households.

→ *Household income.* Household income levels up to $52 000 were coded as low income households, household income levels between $52 001 and $104 000 were coded as medium income households, and household income levels over $104 000 were coded as high income households.

Analyses were conducted to compare renters and owners, household composition groups and household income groups. The type of analysis conducted depended

on the dependent variable: t-tests and ANOVA for continuous dependent variables (i.e. those measured at the interval or ratio level such as attitudes, intentions, etc.) and Chi-square analyses for categorical variables. Because of the large number of analyses being conducted and the potential that raises for increasing the Type 1 error rate, a more conservative probability of $P < 0.01$ was adopted. Thus, the probability of a finding must be less than 0.01 to be considered a statistically significant effect. Where there were substantial effects of the demographic variables on a set of variables, the means are reported in a table. Otherwise, means are reported in the text. Note that the test statistics (e.g. t-values, F values, Chi-square values) are reported in Appendices D to G.

2.4.3 Hierarchical multiple regression analyses

Hierarchical multiple regression analyses were conducted to identify the key predictors of intentions and behaviour. Only the variables that are significant once all variables are entered into the model are discussed.

→ For the analyses predicting intentions the order of entry of the variables was:
  - demographic variables
  - past behaviour
  - expanded TPB variables
  - household culture.

→ For the analyses predicting past behaviour the order of entry of the variables was:
  - demographic variables
  - expanded TPB variables
  - household culture.

2.5 Overall means for the expanded theory of planned behaviour variables for water and energy use and waste minimisation

2.5.1 Attitudes to household sustainability practices

As Figure 3 shows, respondents expressed overwhelmingly positive attitudes to water and energy conservation and waste minimisation, with respondents on average reporting that these actions fall somewhere between quite or extremely good. Moreover, there is little variation across cities or actions.

Figure 3: Mean attitudes to water conservation, energy conservation and waste minimisation
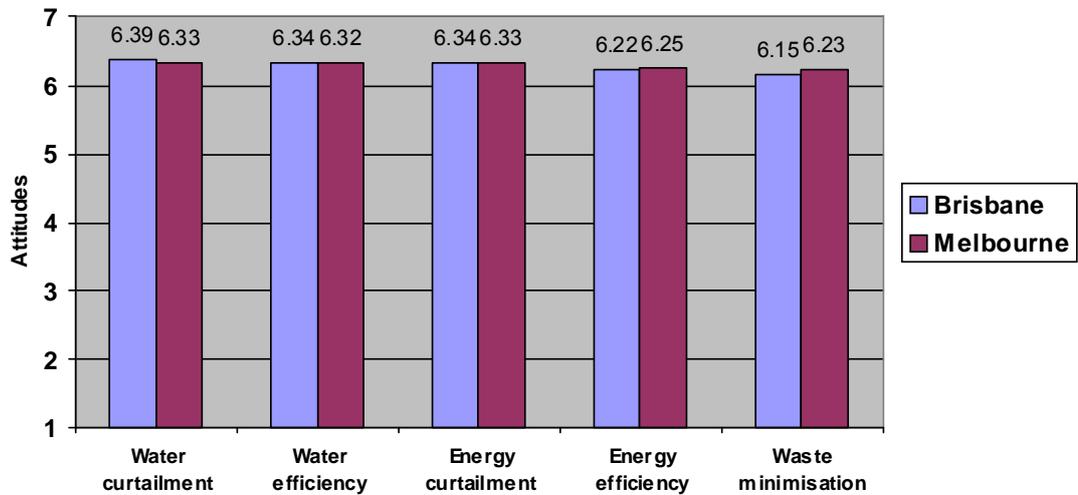
2.5.2 Subjective norms: perceptions of support from important others for sustainability practices

Figure 4 shows perceptions of whether other important people support the sustainability practices. The means fell between somewhat agree and agree.

Figure 4: Mean subjective norms in relation to water conservation, energy conservation and waste minimisation
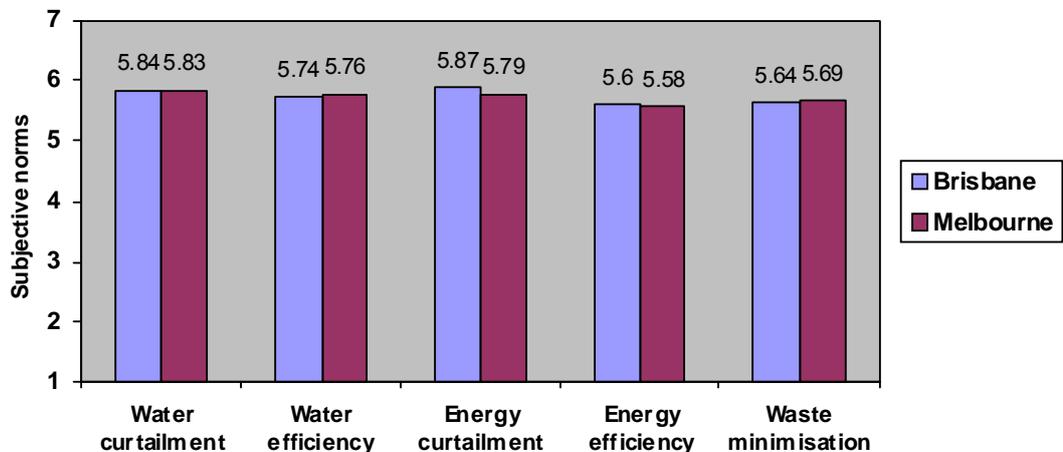
2.5.3 Descriptive norms

As Figure 5 shows, respondents' impressions of whether people in their community engage in the sustainability actions is relatively consistent across practices and cities, although the mean descriptive norms for energy conservation is slightly lower than for water conservation. This may reflect the focus on water conservation in both cities that has resulted from recent drought conditions.

Figure 5: Mean descriptive norms in relation to water conservation, energy conservation and waste minimisation
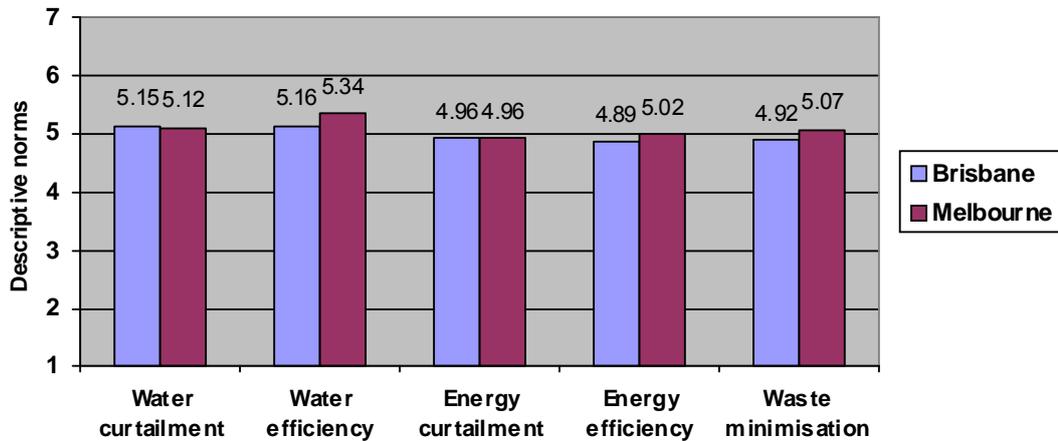
2.5.4 Self-efficacy

Respondents, on average, expressed relatively high levels of confidence that they could engage in the sustainability actions, although it is clear that they expressed higher self-efficacy in relation to water and energy curtailment actions than water and energy efficiency actions (see Figure 6). This difference was statistically significant for Brisbane respondents on both practices (water conservation: $F(1597) = 11.09$, $P = 0.001$; energy conservation: $F(1597) = 31.29$, $P < 0.001$) and for Melbourne respondents on energy practices: $F(1589) = 12.33$, $P < 0.001$). The higher levels of self-efficacy for curtailment than efficiency may reflect time and expertise required for efficiency practices relative to curtailment practices.

Figure 6: Mean self-efficacy in relation to water conservation, energy conservation and waste minimisation
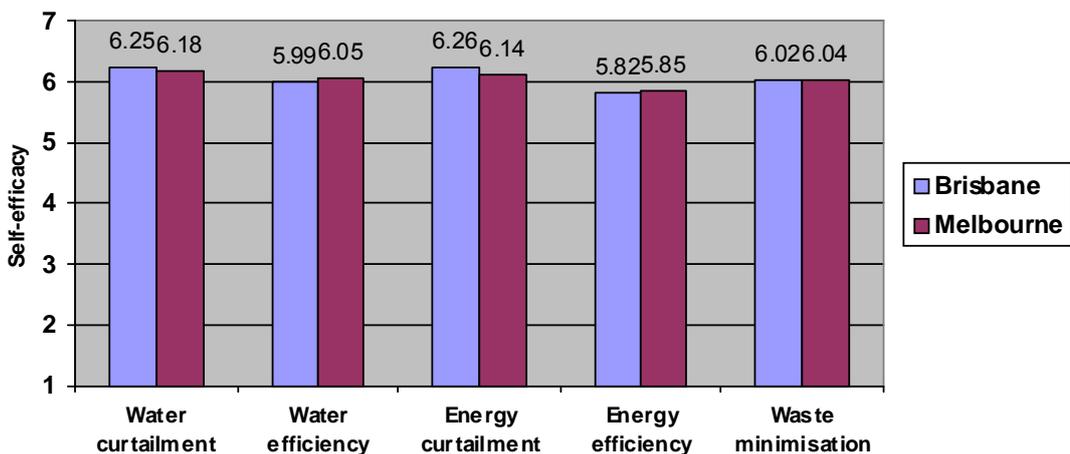
2.5.5 Perceptions of control

Overall, mean responses fell between somewhat agree and agree, suggesting that on average, respondents felt a reasonable amount of control over engaging in the sustainability actions. As Figure 7 shows, Brisbane respondents felt they had more control over energy curtailment than energy efficiency actions and this difference was significant ($F(1597) = 12.79$, $P < 0.001$). As noted above, the

differences in energy curtailment and efficiency practices may relate to barriers such as cost and time that are associated with energy efficiency.

Figure 7: Mean perceptions of control in relation to water conservation, energy conservation and waste minimisation
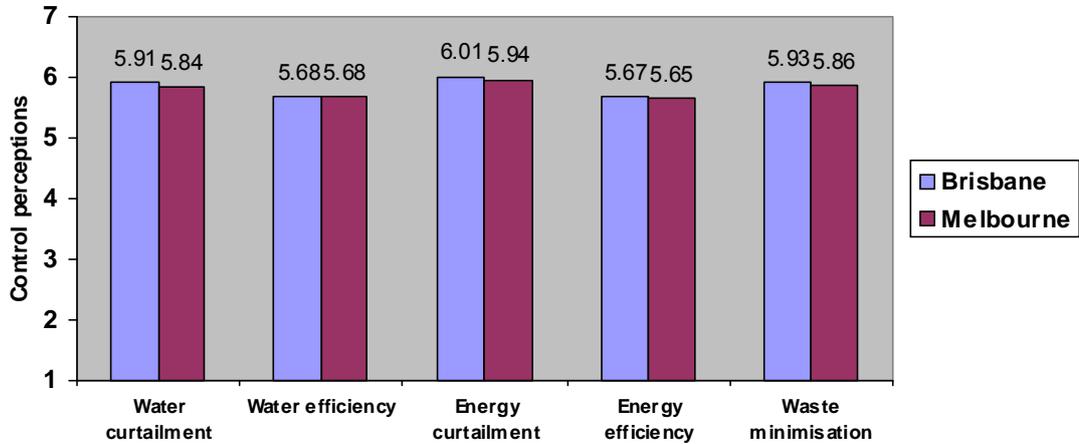
2.5.6 Household culture

As Figure 8 shows, on average Brisbane and Melbourne respondents had a reasonably strong sense of their household having an environmentally sustainable culture. Figure 9 also shows the percentage of respondents who agreed or strongly agreed with each of the separate questions that make up the scale. Clearly, there was majority agreement with the questions providing further evidence of an environmentally sustainable culture among householders.

Figure 8: Mean household environmental culture for Brisbane and Melbourne respondents
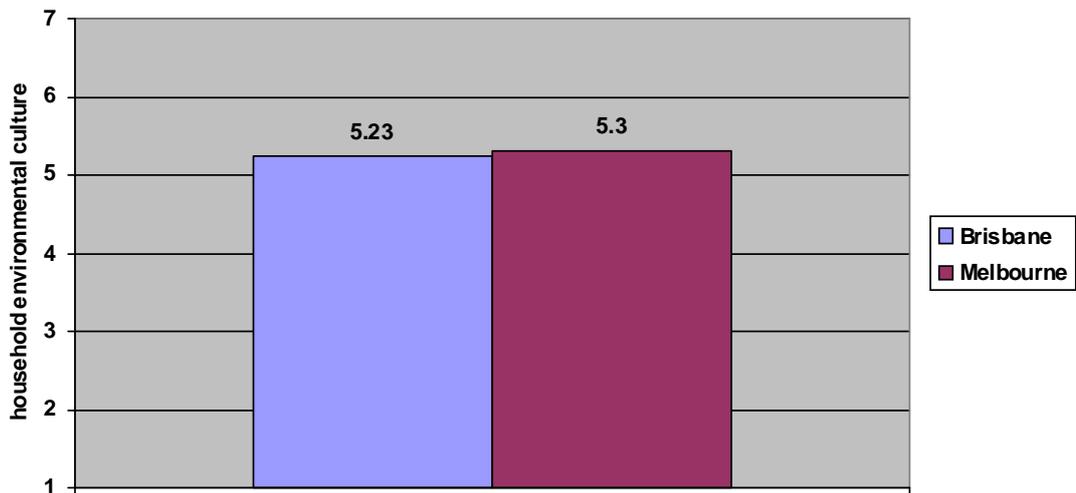
Figure 9: Percentage of respondents who agree or strongly agree with the household culture questions (full questions listed in Table 5)
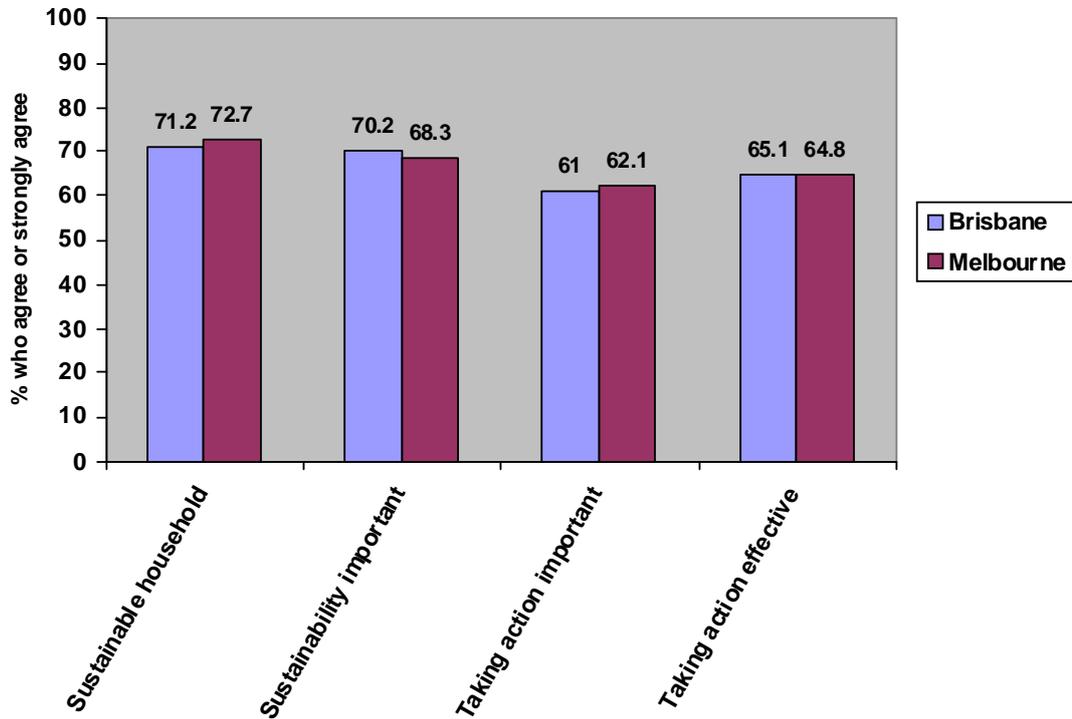
2.5.7 Intentions

On average, intentions were high for all of the sustainability actions, although the means suggest that intentions are somewhat lower for efficiency actions than curtailment actions. Supporting this conclusion, analyses showed that Brisbane respondents expressed significantly stronger intentions to engage in water and energy curtailment than efficiency actions (water: $F(1597) = 8.97$, $P = .003$; energy: $F(1597) = 31.56$, $P < 0.001$). Melbourne respondents also had stronger intentions to engage in energy curtailment than efficiency actions ($F(1589) = 22.35$, $P < 0.001$).

Figure 10: Mean intentions in relation to water conservation, energy conservation and waste minimisation
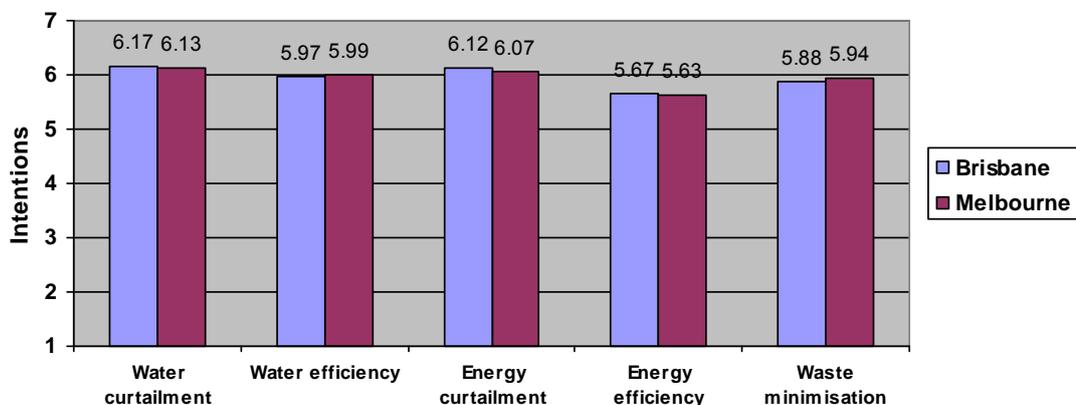
3 HOUSEHOLD WATER CONSERVATION

Listed in Table 8 below are the water curtailment and efficiency actions that were presented to all participants prior to the survey questions asking about water conservation. Note that statistics relating to the demographic comparisons are reported in Appendix D.

Table 8: Curtailment and efficiency actions to conserve water

Curtailment actions (everyday actions to save water)	Efficiency actions (installation of water-efficient devices)
Check and fix leaking taps	Low-flow taps and/or showerheads
Only run dishwasher when full	Pool cover
Have shorter showers	Hose with trigger or timed watering system
Use half flush or don't flush every time	Water-efficient dishwasher
Wash cars with minimal water	Rainwater tank
Turn off taps when brushing teeth	Water-efficient washing machine
Only run washing machine with full loads	Greywater system
Use greywater (e.g. from washing machine, showers, kitchen) on garden	Dual-flush or composting toilet
Be water-wise in the garden (e.g. drought-tolerant plants, less watering)	Shower timer

3.1 Frequency of engaging in water curtailment actions

As Table 9 shows, Melbourne and Brisbane respondents report high levels of engagement in water curtailment actions with most means falling between almost always and always. As Figure 10 shows, most of the practices appear to be accepted practice, with the majority of respondents engaging in the everyday water-conserving practices. The exception is taking shorter showers and using greywater on the garden.

Table 9: Mean water curtailment behaviour for Brisbane and Melbourne respondents

Curtailment actions	Brisbane mean (SD)	Melbourne mean (SD)
Check and fix leaking taps	4.44 (.89)	4.39 (.90)
Only run dishwasher when full	4.62 (.75)	4.54 (.88)
Have shorter showers	4.32 (.83)	4.23 (.88)
Use half flush or don't flush every time	4.51 (.80)	4.44 (.84)
Wash cars with minimal water	4.65 (.78)	4.51 (1.05)
Turn taps off when brushing teeth	4.61 (.73)	4.61 (.72)
Only run washing machine with full loads	4.62 (.61)	4.59 (.72)
Use greywater on garden	3.45 (1.49)	3.72 (1.37)
Be water wise in the garden	4.54 (.73)	4.60 (.73)

Note: Values ranged from 1 never to 5 always.

Figure 11: Percentage of respondents (for whom the behaviour is applicable) who report always engaging in these actions
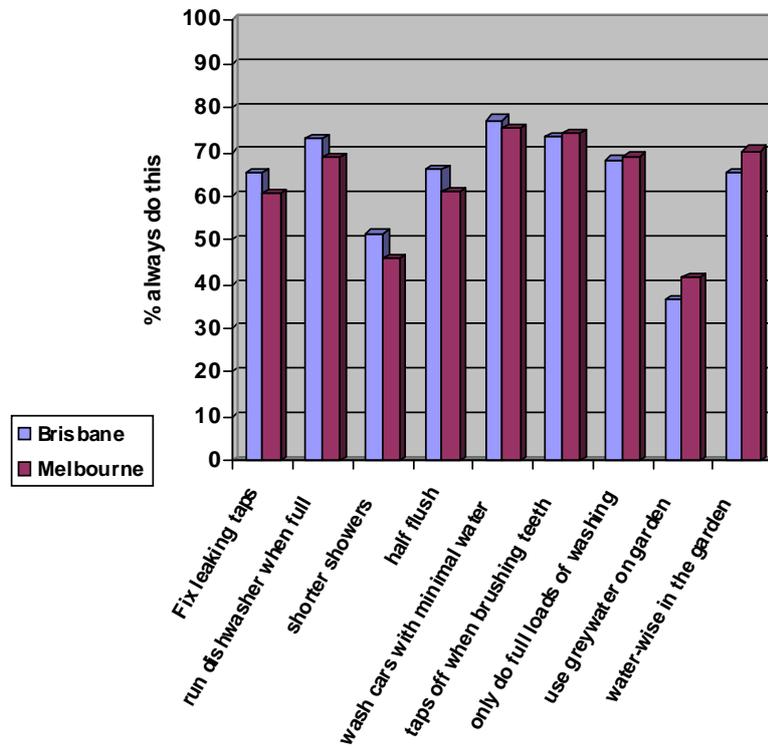
Comparison of renters and owners on water curtailment actions

Mean levels of water curtailment actions for renters and owners in Brisbane and Melbourne are shown in Table 10. Comparison of renters and owners on water curtailment actions showed that Brisbane owners reported engaging in significantly higher levels of the following actions than renters:

→   checking and fixing leaking taps

→   only running the dishwasher when it's full

→   using half flush or not flushing every time

→   washing the car with minimal water

→   turning off the tap when brushing teeth

→   water-wise gardening.

The same comparison of Melbourne owners and renters showed that owners reported significantly higher rates of the following behaviours than renters:

→   checking and fixing leaking taps

→   only running the dishwasher when it's full

→   having shorter showers

→   use half flush or not flushing every time

→   water-wise gardening.

Table 10: Means for owners and renters in Brisbane and Melbourne on water curtailment actions

	Brisbane		Melbourne	
Curtailment actions	Owners	Renters	Owners	Renters
Check and fix leading taps	4.54	4.24*	4.46	4.21*
Full loads in dishwasher	4.68	4.45*	4.65	4.00*
Shorter showers	4.37	4.24	4.28	4.11*
Half flush, flush less often	4.63	4.28*	4.51	4.28*
Wash car with minimal water	4.71	4.50*	4.56	4.34
Turn off tap when brushing teeth	4.67	4.49*	4.62	4.57
Full loads of washing	4.66	4.56	4.60	4.57
Using greywater on garden	3.49	3.30	3.69	3.78
Water-wise in the garden	4.59	4.41*	4.64	4.47*

Note: Values on scale ranged from 1 never to 5 always; *means differ from each other at $P < 0.05$ or below.

Comparison of household composition groups on water curtailment actions

Mean curtailment actions by household composition are displayed in Table 11. For Brisbane the only statistically significant differences to emerge across household composition groups were on:

→ using greywater on the garden

→ water-wise gardening.

Post hoc tests showed that family households used greywater significantly less frequently compared to single adult and multiple adult households (single person mean = 4.36, multiple adult mean = 4.30, family mean = 3.65). Similarly, family households were significantly less likely to be water-wise in their garden compared to single adult and multiple adult households (single person mean = 4.93, multiple adult mean = 4.72, family mean = 4.46).

For Melbourne respondents, single adult households differed significantly in the extent to which they:

→ only run dishwasher when it is full

→ do water-wise gardening.

In all cases single-person households engaged in more of these actions compared to multiple adult households and family households (dishwasher: single person mean = 4.93, multiple adult mean = 4.72, family mean = 4.46; water-wise gardening: (single person mean = 5.47, multiple adult mean = 5.10, family mean = 5.01).

Comparison of household income groups on water curtailment actions

Among Brisbane respondents, household income groups significantly differed on:

→ taking shorter showers

→ water-wise gardening.

All household income groups differed from each other such that low-income households reported the most short showers followed by medium and high-

income households (low income mean = 4.50, medium income mean = 4.30, high income mean = 4.07). Low-income households also reported engaging in more water-wise behaviour in the garden than medium or high-income households (low income mean = 4.68, medium income mean = 4.50, high income mean = 4.36).

Among Melbourne respondents, household income groups significantly differed on:

→ using greywater on the garden.

Low-income households had used greywater more on their garden than high-income households (low income mean = 3.92, medium income mean = 3.66, high income mean = 3.29).

3.2 Installation of household water efficiency appliances

Inspection of Figure 12 shows that a majority of Brisbane and Melbourne respondents have already installed low-flow taps or showerheads, hoses with triggers or timed water systems, water-efficient washing machines and dual-flush toilets.

Figure 12: Percentage of respondents who have installed water-efficient devices in Brisbane and Melbourne
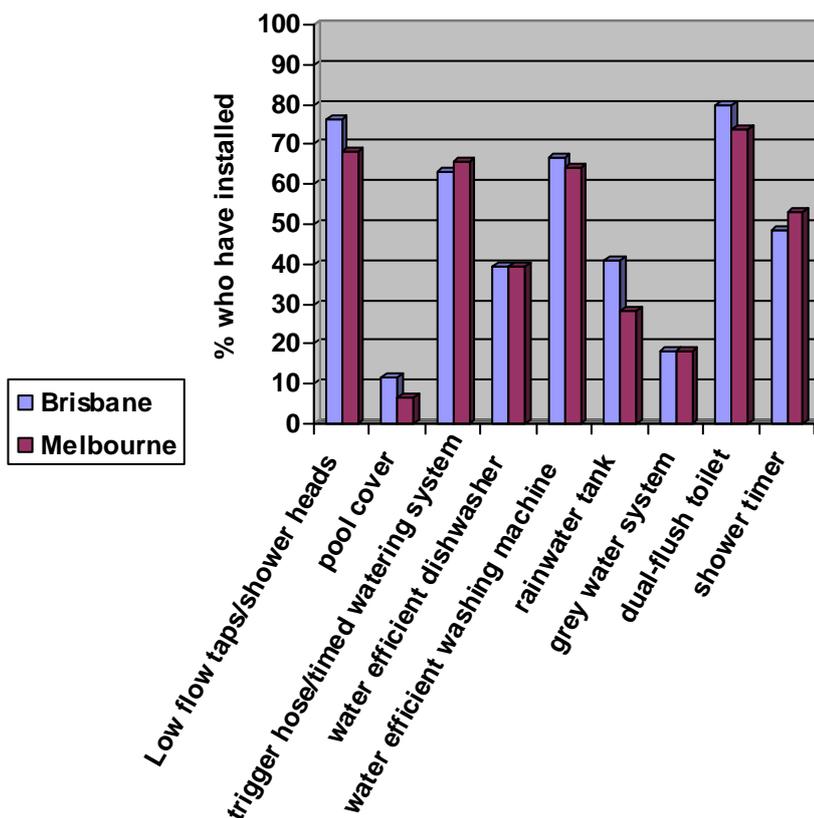
Comparison of owners and renters on installation of water-efficient devices

The percentage of owners and renters who have installed water-efficient devices is shown in Table 11. Among Brisbane respondents, owners were significantly more likely than renters to have installed:

→ low-flow taps and showerheads

→ pool cover

→ hose with trigger or timed water system

→ water-efficient dishwasher

→ dual-flush or composting toilet.

Among Melbourne respondents, owners were significantly more likely than renters to have installed:

→ low-flow taps and showerheads

→ hose with trigger or timed water system

→ water-efficient dishwasher

→ rainwater tank

→ dual-flush or composting toilet.

Table 11: Percentage of renters and owners who have installed water-efficient appliances

	Brisbane		Melbourne	
	Owners	Renters	Owners	Renters
	per cent	per cent	per cent	per cent
Low-flow taps and showerheads	81.3	65.8	72.1	58.4
Pool cover	14.2	6.0	7.3	5.4
Hose with trigger or timed watering system	70.6	47.2	72.4	48.2
Water-efficient dishwasher	44.8	28.6	48.0	16.9
Water-efficient washing machine	68.2	64.3	64.9	62.7
Rainwater tank	52.0	19.1	33.7	13.9
Greywater system	19.7	14.6	18.5	18.1
Dual flush or composting toilet	83.8	71.9	78.7	60.2
Shower timer	51.2	42.7	55.3	47.6

Comparison of household composition groups on installation of water-efficient devices

In terms of differences across household composition groups, among Brisbane respondents the only difference to emerge was on:

→ installation of rainwater tanks.

More multiple adult and family households had installed a rainwater tank than single-person households (single person: 26.1%, multiple adult: 44.1%, family: 42.9%).

Among Melbourne respondents, a significant difference emerged across household groups on:

→ installing a water-efficient dishwasher.

Significantly more family households and multiple adult households had installed a water-efficient dishwasher than single-person households (single person: 18.8%, multiple adult: 42.5%, family: 43.2%).

Comparison of household income groups on installation of water-efficient devices

Although the tendency was for high-income households to have installed more water-efficient devices than medium or low-income households, among Brisbane households the only significant difference was on:

→ installing a water-efficient dishwasher.

The number of households who had installed a water-efficient dishwasher was lowest in the low-income households (31.3%), higher in the medium-income households (43.1%) and higher in the high-income households (50.5%).

The same finding emerged for Melbourne respondents (low income: 30.6%, medium income: 44.3%, high income: 51.4%).

3.3 Intentions to install water efficiency appliances

Respondents who had not already installed the water-efficient appliances (and for whom they are applicable) indicated whether they intended to install them over the next six months. Table 12 displays the means for this group. Most of the mean scores fell between may not install and unsure, suggesting that for those people who had not already installed the devices, intentions to install them in the near future were not strong. Intentions were stronger (falling between unsure and may install) among Melbourne respondents to install low-flow taps and/or showerheads, a rainwater tank, and dual-flush or composting toilets, and for Brisbane and Melbourne respondents, for installing a hose with trigger or timed watering system.

Table 12: Mean intentions to install water-efficient appliances over the next six months

Efficiency actions	Brisbane mean (SD)	Melbourne mean (SD)
Low flow taps/showerheads	2.89 (1.29)	3.41 (1.27)
Pool cover	2.78 (1.34)	2.83 (1.43)
Hose with trigger/timed watering system	3.52 (1.32)	3.58 (1.32)
Water-efficient dishwasher	3.01 (1.16)	3.02 (1.36)
Water-efficient washing machine	3.26 (1.16)	3.14 (1.23)
Rainwater tank	3.09 (1.31)	3.32 (1.36)
Greywater system	2.82 (1.26)	2.95 (1.34)
Dual-flush or composting toilet	2.92 (1.45)	3.34 (1.36)
Shower timer	2.93 (1.31)	3.05 (1.28)

Note: Values ranged from 1 Definitely will not install to 5 Definitely will install.

Comparison of owners' and renters' future intentions to install water-efficient appliances

No significant differences emerged between Brisbane owners' and renters' intentions to install water-efficient appliances. For Melbourne owners and renters a significant difference emerged on:

→ intentions to install a rainwater tank.

Owners were more likely to intend to install a rainwater tank than renters (owners: mean = 3.45, renters mean = 2.92).

Comparison of household composition groups' future intentions to install water-efficient appliances

Among Brisbane respondents, the only significant difference to emerge was on:

→ intentions to install a greywater system.

Family households had significantly lower intentions to install a greywater system compared to single adult and multiple adult households (single adult mean = 4.63, multiple adult mean = 4.51, family mean = 3.89). There were no significant differences across household composition for Melbourne respondents.

Comparison of household income groups' future intentions to install water-efficient appliances

There were no differences in intentions across household income groups for either Brisbane or Melbourne respondents.

3.4 Predicting water curtailment intentions

For the analyses predicting water conservation intentions, current behaviour in relation to doing full loads in the dishwasher, washing the car with minimal water, and collecting greywater for the garden were not included in the analysis because the items did not apply to some respondents (i.e. those who did not have a dishwasher, own a car, or have a garden). To include these items therefore would have reduced the sample size for the analyses. Beta weights once all of the variables are entered into the model are shown in Table 13.

Among Brisbane respondents the variables explained 66 per cent of the variance in water curtailment intentions. The only significant predictors of intentions to engage in everyday actions to conserve water around the home were the size of the garden, attitudes, subjective norms and self-efficacy. Thus, among Brisbane respondents *stronger intentions to engage in water curtailment actions* were associated with:

→ larger gardens

→ more positive attitudes to curtailment actions

→ greater belief that important others support water curtailment actions

→ feeling confident about engaging in these actions.

Among Melbourne respondents, the variables explained 64 per cent of the variance in water curtailment intentions. The significant predictors were: current behaviour relating to using half-flush or not flushing every time, attitudes, subjective norms and self-efficacy. Thus, Melbourne respondents who expressed *stronger intentions to engage in water curtailment actions* reported:

→ more often using half-flush or not flushing every time

→ positive attitudes to water curtailment actions

→ a greater belief that important others supported water curtailment actions

→ feeling confident about engaging in these actions.

Table 13: Significant predictors of water conservation curtailment intentions for Brisbane and Melbourne respondents

Variables	Brisbane	Melbourne
Demographics	β	β
Gender	-0.00	0.00
Age	-0.01	0.01
Household tenure	-0.03	-0.07
Household income	-0.06	-0.04
Level of education	0.01	0.00
Dwelling type	-0.06	-0.02
Number in house	-0.00	-0.01
Household composition	0.01	-0.01
Number of bedrooms	0.02	0.01
Size of garden	0.09*	-0.01
Past behaviour		
Check and fix leaking taps	0.01	0.01
Shorter showers	0.00	0.03
Half flush or don't flush every time	0.01	0.09*
Turn off taps when brushing teeth	0.07	-0.01
Only run washing with full loads	-0.03	0.05
Water-wise in the garden	0.03	0.04
TPB variables		
Attitudes	0.17**	0.24***
Subjective norms	0.29***	0.29***
Descriptive norms	0.02	0.03
Self-efficacy	0.41***	0.36***
Perceptions of control	0.06	0.07
Household level variables		
Household culture	0.05	-0.06

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$. Note. Betas represent final betas once all variables are entered into the model

3.4.1 Beliefs that underpin attitudes

As noted above, attitudes were a significant predictor of water curtailment intentions. According to the Theory of Planned Behaviour, our attitudes about water curtailment actions are underpinned by beliefs about the advantages and disadvantages of engaging in these types of actions. The qualitative interviews elicited householders' beliefs about the advantages and disadvantages of water curtailment actions and therefore can provide insight into the factors that can help to shape householders' attitudes.

3.4.2 Advantages of water curtailment actions

Cost savings and saving water

The majority of householders reported both cost savings and saving water as the main advantages of participating in curtailment behaviour, although when asked, some householders did prioritise cost saving over saving water:

> Well cost again is a benefit. Water-wise, Victoria is in a terrible state so we're definitely very conscious about that. I don't think anybody moves in Victoria without considering the water.

Saving water was viewed as being 'critical', and a 'serious issue', something that householders had 'worried' about for many years and that they felt 'strongly' about. The advantage for some was their knowing that they were 'doing the right thing'.

Environmental benefit

The advantage of water-saving behaviour was compared to the advantages of energy-saving behaviour by participants and it was not unusual for householders to discuss the necessity of water-saving measures with greater urgency than either energy-saving or waste-reduction behaviours:

> First and foremost I think about the cost-saving rather than the environmental effects of energy. But in terms of water I'm thinking of the environment.

Householders spoke of the advantage of building water reserves rather than wasting them, of water as a 'precious commodity', and the advantage of just generally being a water-conserving community that was 'going to help everyone in the long run' and that being 'water efficient' was a 'good way to be'.

Thinking about the future

Another advantage that was mentioned was in relation to the need to ensure future water supplies:

> We need to save water. Especially somewhere like Australia, Queensland where there's not enough water … I think the main point is that there's certainly not enough water in Queensland and this will have an impact in 10–20 years' time because it doesn't look like it's going to get any wetter in the future.

Maintain the garden

Householders who were bucketing or diverting water from their washing machine, kitchen or bath were intent on maintaining their garden as it was an important aspect of their lives.

> … because we want the garden to grow, we're not prepared to – no, it's not a compromise it's just that we like the garden and we know that we can use the greywater effectively and it also gives exercise to everybody because they've got to cart it around. And it just gives – yeah, everybody's involved.

Other

For others, behaviour around washing a car with a bucket, for example, had turned into a family event rather than the 'quick chore' it was previously.

A collateral advantage of participating in curtailment behaviours, 'particularly the things that are not expensive' was that they were regarded as simple to do and that householders derived their own satisfaction as a result.

3.4.3 Disadvantages of water-saving curtailment behaviour

Inconvenience

Householders discussed the inconvenience of having to manually move their water around as a 'hassle' or a 'pain' but this was not considered overly inconvenient or something that prevented them from doing the behavior. It was also inconvenient to set up a 'makeshift' greywater system such as a hose from the washing machine to the garden as it meant running the hose through the house which was not seen as ideal.

Prescribed watering times were also considered inconvenient to some householders when they did not suit their routine, and not being able to wash one's own car themselves with a hose rather than a bucket or taking the car to a car wash was 'annoying'. Another inconvenience was expressed as a result of 'the government getting a bit carried away' with one householder disgruntled at having the choice of hose nozzle prescribed by government.

Householders had experienced discomfort as a result of their neighbours' kitchen greywater system that they regarded as unhygienic, and at times, particularly on warm days and when the system overflowed, there was an unpleasant odour associated with the practice.

One disadvantage of having purchased a front-end loading washing machine for one household was the loss of greywater to water the garden.

Loss of life's little luxuries

Some householders lamented the loss of their garden, particularly when they were not attracted to drought-tolerant plants:

> Yeah I'd love to do lots more watering in the garden ... I'd like to have a decent garden.

Other householders, while acknowledging the importance of water to the Australian lifestyle, lamented no longer being able to let their children play under the sprinklers, something which they had grown up doing:

For others it was the loss of the luxury of lolling in a shower or taking a bath. To some it was their *one pleasure* and the *comfort* of taking a longer shower outweighed all good intentions of taking a shorter shower.

> But I know that's my drawback here with the showers, that somehow it's my one pleasure that's difficult to – I try to shorten it, I have to admit, but when I wash my hair I like to have a bit more comfort and stay there for a bit longer.

Washing cars with minimal water was perceived as a disadvantage in two senses – first some believed that it would be much more efficient to wash a car with a hose as this would use less water than the eight buckets they used to wash the car, while another would not take their car to a car wash as an alternative to washing with minimal water as they believed the recycled water or the additives potentially damaged the car paint.

Increasing water charges offer no incentive

While householders had implemented a whole range of behaviours, they were very aware that water costs continued to rise, offering them very little reward or advantage for their action:

But what gets me now is you're using less water, there's less water going into the sewage system which is less treatment, yet you're still paying for the treatment the same, if not more, than you used to in your rates. You know, it's all a one-way street. There should be an advantage in it, which there isn't. You're putting more effort into it, you want to help, you're doing everything you can and you get slugged for it at the same time.

Shared water charges

While it may not influence the householder's water-saving habits, those living in apartments that were not individually metered were very dissatisfied with having to share the water charges across all apartments:

I don't like using excess water and I get really angry that in a set of townhouses like this, whatever the bill is we have to share it, divide it by eight and I don't use hardly any and there's others that waste it and don't care about it ….

3.4.4 Summary of advantages and disadvantages

These findings suggest that positive attitudes to water curtailment actions are primarily underpinned by beliefs about the cost-savings and environmental benefits of everyday water-saving behaviours. People are concerned about water reserves now and in the future and this concern potentially makes them feel more positive toward actions that help to conserve water. The connection between gardening and curtailment actions is evident in both the survey findings and the interviews; people with larger gardens had greater intentions to engage in water curtailment actions and the interviews suggest that this is because it allows them to maintain their gardens.

Not surprisingly the inconvenience of water curtailment actions and the loss of some of the luxuries that go along with using water are the key disadvantages that may influence householders' attitudes to everyday water actions. To the extent that the inconvenience and loss of luxuries outweigh the perceived benefits, householders may have more negative attitudes to everyday water conserving actions. The latter two disadvantages (increased water charge and shared water charges) are not specifically disadvantages of curtailment actions; however, they are factors that people might offset against any perceived benefits of water conservation. Following this logic, householders might perceive that there is little benefit in conserving water if the utility is going to increase water prices or if their own behaviour has little impact on their water bills.

3.4.5 Beliefs that underpin confidence in engaging in water curtailment actions

Another important predictor of water curtailment intentions was how much confidence householders felt in their ability to engage in the actions. According to the TPB, this sense of confidence is underpinned by a set of facilitators and barriers that may be real or perceived.

3.4.6 Facilitators of water curtailment actions

Most participants reported everyday actions as not difficult to do and, consistent with the findings from the survey data, many householders reported doing these things and some had been doing some of the actions on an everyday basis for a long time. One householder indicated that they would be doing the actions even if there wasn't a drought, commenting that the actions were 'just common sense'.

Education

Education was identified as something that would help, particularly in educating children who were sometimes the main cause of high water use, particularly teenage children. Others had been educated by their children who were bringing information home from school and telling their parents 'this is what we've got to do …'.

Feedback on household water use

Receiving feedback on household water use also helped householders' curtailment measures. They were often interested to find out how they had gone over the previous quarter and *happy* to find out that they had reached the target, and had sometimes achieved well within the target.

> I do think it's a good thing to have it on the bill so you can actually see where you're at. It makes you more conscious, yeah.

3.4.7 Barriers to water-saving curtailment behaviour

The actions of others

The major barrier in terms of householders' curtailment behaviour was the actions of others in the household, in particular children, aging parents or friends, and the action most difficult to implement and sustain was shorter showers. Younger children and teenage children as well as the women in the family often had difficulty having shorter showers.

Toilet flushing was another area that was difficult to implement, particularly with children who are still learning and with guests who can be *a little difficult.*

Changing the time householders spend in the shower proves difficult despite the influence of education:

> They do it through school too. I've seen some of their subjects come back like they're talking about how the rain is and how to recycle and all that sort of stuff so it is coming through. But it goes over the top when it comes to the bathroom, that's the one place—and of course the toilet; the toilets flush all the time.

Habit

Difficulty in changing old habits was another barrier to householders' curtailment behavior. This was most pronounced for turning the taps off when brushing teeth and, as in the quote below, shaving. Leaving the tap running was a habit that individuals had been doing as a child and continued to do into their adulthood. Most were aware of the habit and aware of the waste.

Practical difficulties and other circumstantial barriers

A number of householders identified the impracticality of reusing their greywater in terms of household design, of trying to get children to carry water and of having to place water pipes inconveniently through the house.

Householders also spoke of the damage to appliances as a result of water-saving practices, for example setting up a makeshift greywater system from the washing machine resulted in damage to the washing machine due to the extra load placed on the washing machine to pump water a long distance to the garden. Another householder had limited their practice of using a half flush as a result of plumbing issues. Others were unable to undertake some everyday actions such as bucketing greywater to the garden due to age or injury.

Rental properties

Poor maintenance of both private rental and public housing property posed a significant barrier to householders' water saving barriers, particularly in terms of unrepaired or poorly repaired leaking taps.

Other barriers

Householders identified a number of other barriers to their participation in curtailment behaviors, including hygiene concerns about not flushing the toilet every time and similarly using the dishwasher despite it not being full; child safety concerns associated with installing a pool cover; the perceived need for a longer shower, especially when working in a 'messy job' such as the car industry; and not having the 'know-how' to set up a 'makeshift' greywater system.

Finally, one or two householders' beliefs about climate change clashed with pro-environmental behaviour. In these instances householders were skeptical about the water imperative and resented being told what to do:

> Australia is a dry country and if people haven't worked that one out, well they shouldn't be working where they're working. Because the increase of population … I think it was about five or six million when I came to Australia. So we're talking an extra 20 million and people are wondering why there's no water ….

3.4.8 Summary of barriers and facilitators to water curtailment actions

Taken together, the interviews suggest a number of factors that may promote or undermine householders' confidence in their ability to engage in everyday water-saving actions. On the one hand, bottom-up education processes and getting feedback about progress on water use may help increase confidence, whereas the lack of control over the actions of others, overcoming 'bad' water-using habits, and practical difficulties could undermine confidence. Consistent with the survey findings that show differences between owners and renters in terms of water curtailment actions, the maintenance of plumbing equipment in rental properties was cited as a barrier to water curtailment. It is also clear that beliefs that everyday water-saving actions may have negative health and hygiene implications and environmental beliefs more broadly (e.g. climate change skepticism) may also act as barriers to water curtailment actions.

3.4.9 Developing supportive social norms

Another key predictor of water curtailment intentions was perceptions of whether important others supported these types of actions. From a TPB perspective, our perceptions of normative support are underpinned by an assessment of how much salient others approve or disapprove of the behaviour. According to the interviews, the majority of householders believed that in general most family and friends would approve of their water-saving actions, that they would 'probably be doing the same things' or 'at least something', or 'their bit'. Others simply stated that 'everyone would approve'.

Others could not see how anyone could disapprove as they didn't think they were 'doing anything wrong' and another, when asked if there were any individuals or organisations who would approve or disapprove of their water-saving actions, described the importance people placed on water saving in comparison to other sustainability areas:

> I think water waste is now becoming like an Aussie joke … It's become a part of society. I think Australians—and they should be—are more concerned about the water than they are about anything else really.

Householders believed that people did not so much disapprove as not 'understand' or who had a 'different opinion' or who simply 'ignored' any imperatives around water-saving activity because:

> … there's a certain amount of speculation that the Victorian government are not exactly telling the truth about how much water is available, and there's always going to be—based on the current population of Victoria, the supplies might be low but it's going to rain enough for there to always be enough. And especially once the de-sal plant goes live it won't matter anyway, so there's quite a lot of apathy, I think, with people.

Friends were reported as casting a disapproving eye over their host's behaviour and requests while another householder reported that friends or colleagues 'laughed' or questioned their behaviour, thinking they were taking things to an extreme, such as putting gardening weepers into individual plants, or putting a brick in the toilet, or transferring bath water to their washing machine, not seeing 'a small thing like that as significant'.

Others who disapproved were children and other household members, particularly in relation to having shorter showers.

Taking these comments into consideration, we can conclude that where householders feel widespread support from family and friends for engaging in water curtailment actions, their intentions will be stronger than in situations where support from a variety of sources is mixed or ambivalent.

3.5   Predicting water conservation efficiency intentions

For the analyses relating to water efficiency intentions, the indoor and outdoor water efficiency index was entered at Step 3 to assess the impact of past behaviour on future intentions. As a reminder, the index is a measure of the number of water-efficient devices installed inside or outside of the home. Beta weights once all variables are entered into the model are shown in Table 14.

Among Brisbane respondents, the variables explained 65 per cent of the variance in water efficiency intentions. The significant predictors of water efficiency intentions were: outside water efficiency devices, subjective norms and self-efficacy. Thus, Brisbane respondents who reported stronger intentions to save water through installing water-efficient devices were those who had:

→ Installed more water-efficient devices outside their home in the past.

→ Perceived greater support from important others for installing water-efficient devices.

→ Felt confident that they could save water in this way.

Among Melbourne respondents the variables explained 56 per cent of the variance in water efficiency intentions. The significant predictors were: age, dwelling type, household composition, outside efficiency index, attitudes, subjective norms and self-efficacy. Thus, Melbourne households with stronger intentions to install water-efficient appliances are those who:

→ are younger

→ live in free-standing houses

→ are single-person households

→ have installed more water-efficient devices outside their home

→ have more positive attitudes toward installing water-efficient devices

→ perceive greater support from important others for installing water-efficient devices

→ feel confident that they can save water in this way.

Table 14: Significant predictors of water conservation efficiency intentions for Brisbane and Melbourne respondents

Variables	Brisbane	Melbourne
Demographics	β	β
Gender	-0.01	-0.02
Age	-0.00	-0.11*
Household tenure	-0.04	0.01
Household income	-0.04	-0.06
Level of education	0.03	0.07
Dwelling type	-0.02	0.14**
Number in house	-0.01	0.06
Household composition	0.03	0.12*
Number of bedrooms	0.02	-0.05
Size of garden	-0.04	-0.04
Past behaviour		
Inside water efficiency index	-0.03	0.06
Outside water efficiency index	0.16***	0.11*
TPB variables		
Attitudes	0.09	0.20***
Subjective norms	0.41***	0.35***
Descriptive norms	-0.01	0.03
Self-efficacy	0.45***	0.25***
Perceptions of control	-0.02	0.03
Household level variables		
Household culture	-0.04	-0.09

**$P < 0.01$, ***$P < 0.001$ Note. Betas represent final betas once all variables are entered into the model

3.5.1 Beliefs that underpin positive attitudes to installing water efficiency appliances

For Melbourne respondents attitudes were a significant predictor of water curtailment intentions. The qualitative interviews provide insight into the factors that underpin positive and negative attitudes to water efficiency actions.

3.5.2 Advantages of water efficiency practices

Saving money and saving water

Householders indicated that they had purchased various appliances such as front-end loading washing machines and water tanks and low-flow showerheads and taps in an effort to both reduce their water costs and to save water.

Another advantage of water-saving efficiency behaviour was efficiency: some households had installed a dishwasher believing it offered greater efficiency compared to washing up by hand.

3.5.3 Disadvantages of water-saving efficiency behaviour

In the same way that householders report saving money and efficiency as the main advantages of water-saving efficiency behaviour, householders also reported high costs and inefficiency as the major disadvantages to this type of approach.

Cost of appliances

The high costs of installing appliances such as water tanks and greywater systems were reported as a significant barrier to efficiency behaviour.

> The cost has just stopped us from doing that, at the moment. That's the main thing with that … it's something we can't budget until the next year.

Ineffectiveness

The ineffectiveness of some appliances such as low-flow showerheads or of trigger hoses was reported as a disadvantage of efficiency behaviour:

> … the showerhead that we've got now, sometimes I want to take it off, because there was just no water coming out.

3.5.4 Summary of advantages and disadvantages of water efficiency actions

Results from the interviews suggest that more positive attitudes to installing water-efficient appliances are likely underpinned by beliefs about their water and cost savings, whereas more negative attitudes are likely underpinned by beliefs about the high costs of the appliances and the ineffectiveness of the appliances.

3.5.5 Beliefs that underpin confidence in installing water-efficient appliances

Self-efficacy was an important predictor of intentions to install water-efficient appliances. The interviews provide insight into the barriers and facilitators that help to promote or undermine self-efficacy.

3.5.6 Facilitators of water-saving efficiency behaviour

None of the households had installed a plumbed-in greywater system or a composting toilet; however, virtually all households had installed dual-flush toilets. Very few households who were interviewed had installed a water tank. Many households had taken up opportunities offered by councils and other organisations to change to low-flow showerheads. Many households were using older washing machines which they recognised probably did not have a high water rating; however, households that had purchased a washing machine in the recent past in the main improved their water rating with the purchase while other householders expressed intent to purchase water-efficient washing machine in the future.

Similar to energy-saving efficiency behaviour, keeping costs down and offering incentives were identified as important facilitators of householders' water saving efficiency measures. Other strategies identified, again just as relevant for energy-saving efficiency measures, included limiting household choice and labelling.

Rebates

Rebates were recognised as an effective incentive; however, householders noted that often rebates were only offered for certain periods and needed to be offered more consistently over longer periods of time to be of assistance.

Limiting householder choice

Forcing householder choice by limiting accessibility of inefficient appliances was also seen as another way of facilitating householders' efficiency measures.

> It would make it easier if like the suppliers and the Government kind of enforced the fact that they need to be used so maybe reducing the amount of not so efficient appliances that are on sale….

Labelling

Labelling on products had also helped householders to increase their household efficiency in terms of water use:

> Labelling and information is good. It helps you get informed. It helped us select the appliances and stuff that we bought for our house.

3.5.7 Barriers to water-saving efficiency behaviour

Barriers to householders' water saving efficiency behaviour included government taxes, the cost of retrofitting appliances such as a greywater system, the lack of perceived value of the appliance, the lack of perceived use of the appliance, issues associated with rental properties and other practical and circumstantial barriers. Further barriers included a lack of perceived benefit of the water-efficient appliances, a lack of time to install the appliances, or changes were planned as part of future renovations.

Government taxes

Several Melbourne householders reported that they would not be investing in a water tank due to incurring further government taxes.

> … we won't get one. Because government taxes. What happens is – that especially when you registered to get your rebates, the government had your name on file and apparently you get taxed for some of that water – or you will get taxed ….

These fees were not reported by households who currently owned a water tank; however, given the rumour that the taxes would be linked to those who had used a rebate to purchase a water tank, two other householders in Melbourne had purchased cheaper tanks and had them installed themselves and thus waived the rebate. It was not identified if they had done this as a means of avoiding future taxes.

Cost of retrofitting

The cost of retrofitting, in particular a greywater system, was identified as a barrier.

> The only thing here is, I sit on a slab, and that section of the house is the border, the bricking is the border. So to do anything is a huge job.

Cost versus benefit

Householders who had considered the installation of larger more costly appliances acknowledged some of the hidden costs of the appliance and weighed up the value of the appliance, and even the sustainability of the product in a broader environmental sense, of the energy expended in the manufacturing of appliances:

> …even a rainwater tank. Far more cost benefit and environmental benefit. One of the reservations I have is these—from the environmental point of view—resources, the cost of having these pumps and running the pumps … that's not very energy or resource efficient. You might be saving water but you're … using the electricity inefficiently. You're also wasting the resources because those pumps only have a very limited life, they're only a couple of years. Then you're up for replacing another one and another one and another one, so there's all the manufacture and the resources that go into that. I've seen it more from that side that it wasn't really viable.

No perceived use

A number of households commented that they would not install appliances, in particular, a water tank or a greywater system as they perceived they had no real use for such an appliance. Neither the design of their house, the size of their property or their current needs would merit the installation of these appliances.

One householder had considered both a greywater system and a water tank and concluded in both instances that neither would be viable either in terms of efficiency or in value for money.

Rental properties

Even if they could afford to, householders living in private rental were either reluctant to invest money on water-saving appliances when it was not their property, while those living in public housing were dependent on the government undertaking to install water-saving appliances and saw it as the government's responsibility to do so.

In another instance, a water tank, thought to have been on the property for at least five years, had not been installed for use.

Practical difficulties and other circumstantial barriers

A number of householders were not able to install appliances even if they wanted to as a result of the layout of the property, existing plumbing issues, or the lack of available space.

> On our personal property there is no room. It's just the balcony area. That's where we should put it in and I don't know if it can carry the weight either.

Others did not install a water-efficient shower rose as it would clash with the existing interior design of their home.

3.5.8   Summary of facilitators and barriers to water efficiency actions

The results of the interviews suggest that greater confidence to install water-efficient appliances is likely promoted through labelling that communicates the water efficiency of appliances, providing rebates to overcome costs of the appliances and limiting accessibility to inefficient appliances. On the other hand, confidence may be eroded by the perceived high costs of appliances, a perceived

lack of need or benefit from the appliances, and situational factors such as living in a rental property.

3.6   Predicting past water curtailment actions

In total, the variables predicted 38 per cent of the variance in current water curtailment actions for Brisbane respondents. The significant predictors were: age, tenure, level of education, attitudes, subjective norms and household culture. As Table 15 shows, Brisbane respondents who engaged in more water curtailment actions were those who:

→   owned their home

→   are older

→   have lower levels of education

→   have more positive attitudes to curtailment actions

→   perceive greater normative support from important others for water curtailment actions

→   perceive more of a culture of environmental sustainability in their household.

Among Melbourne respondents, the variables explained 40 per cent of the variance in current water curtailment actions. The significant predictors were: age, level of education, subjective norms, self-efficacy and household culture. Similar to the Brisbane findings, Melbourne respondents who engaged in more water curtailment actions were those who:

→   are older

→   have lower levels of education

→   have more positive attitudes

→   perceive a greater sense of normative support from important others for water curtailment actions

→   are more confident in their ability to save water in this way

→   perceive more of a culture of environmental sustainability in their household.

Table 15: Significant predictors of water conservation curtailment behaviour for Brisbane and Melbourne respondents

Variables	Brisbane	Melbourne
Demographics	β	β
Gender	0.06	0.05
Age	0.22***	0.19***
Household tenure	-0.12*	0.02
Household income	0.04	0.04
Level of education	-0.17***	-0.14**
Dwelling type	-0.09	-0.03
Number in house	-0.07	0.02
Household composition	-0.09	-0.02
Number of bedrooms	0.11	-0.06
Size of garden	0.04	0.04
TPB variables		

Attitudes	0.19**	0.13*
Subjective norms	0.16*	0.18**
Descriptive norms	0.09	-0.04
Self-efficacy	0.06	0.18**
Perceptions of control	-0.05	-0.03
Household level variables		
Household culture	0.21***	0.31***

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$. Note. Betas represent final betas once all variables are entered into the model

3.7 Predicting past water efficiency actions

The regression models had low predictive power for past indoor and outdoor water efficiency actions (accounting for between 8% and 21% of the variance). In light of this low predictive power and the lack of consistency across predictor variables, the analyses are not reported here.

3.8 Changes in water use practices

The percentage of respondents who indicated whether their water use had decreased, stayed the same or increased, is shown in Figure 13. It is clear that the majority (Brisbane: 57.1%; Melbourne: 61.8%) of respondents reported decreasing their water use over the past three years.

Figure 13: Percentage of responses to the question of whether water use had changed during the past three years
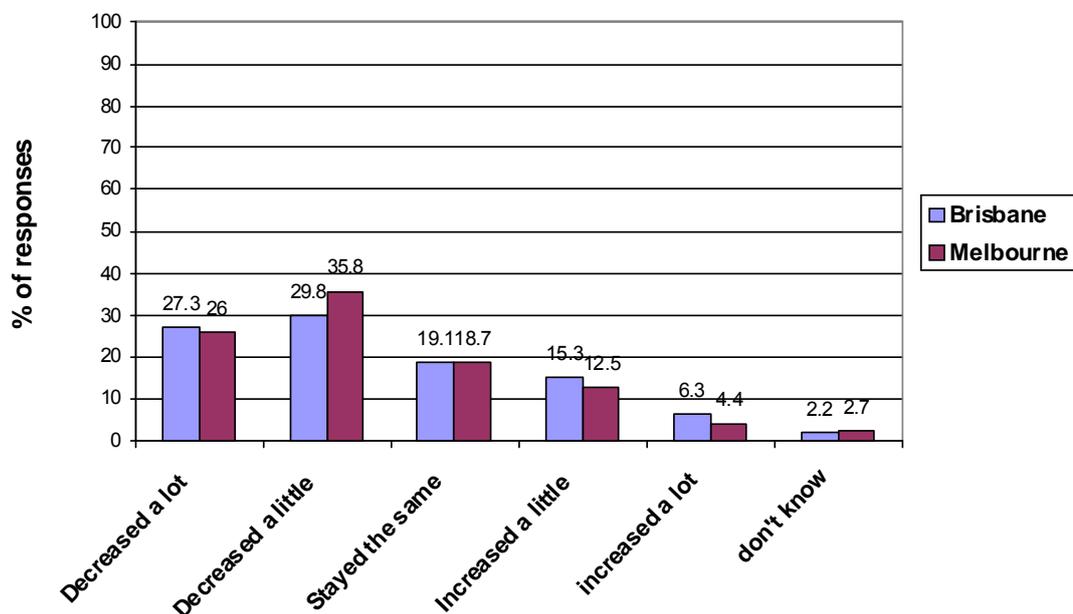
The interview data also provides evidence of changes in water-using practices. Several households reported that they had made some significant changes to their water use behaviour in the past three years, while others reported they were doing some things 'more consistently'.

The extent to which some behaviour had moved from being perceived as a sacrifice to being 'normal' and 'habitual' was reported by one household:

Interviewee 1: The water use, that's definitely [changed].

Interviewee 2: We've changed habits and that sort of thing.

Interviewee 1: Before we used to have a sprinkler system. When we didn't have restrictions we just thought, well, we can water the garden. Now it's finished.

Interviewee 2: Basically, now you're looking wherever you can to conserve water. We use that water that has been used in some form and reuse it.

Interviewee 1: Then it's becoming more and more habitual, you don't have to sacrifice as much but you just think it's becoming normal.

The majority of households reported major changes in one or two areas in the last three years. Many reported changes in both curtailment and efficiency behaviour, such as shorter showers and changes to water use in the garden, such as introducing drought-tolerant plants, reducing or stopping the use of sprinkler systems, or the introduction of water-efficient sprinkling systems.

Other changes identified by households included reduced toilet flushing, car washing, and laundry washing, the installation of water-efficient appliances such as low-flow showerheads, water-efficient washing machines and water tanks. Some made less use of the dishwasher or replaced dishwasher use by hand-washing, acknowledging that they would not have a full dishwasher load. This made both practical sense and saved water.

Some householders commented on the impact the changes had on them personally:

I'm probably doing much less washing. I was terrible. I used to wash every day and that's hard for me because I don't like to have things sitting around.

Other actions households reported they had done or were doing included replacing older appliances with newer water-wise appliances such as dual-flushing toilets, or higher rated water-efficient washing machines, and installing a makeshift greywater system to reuse washing, bath and sometimes kitchen and shower water.

Any time a tap's been replaced I've always opted for the low flow one. Same for the showerhead, but I already had the low flow showerheads. But yes, I just made sure I got the 7.5L one, the four star instead of three star. The last dishwasher I made very sure I looked at both energy and water, 'cause it was only last year.

Comparison of owners' and renters' reported changes in water use

There were no significant differences between Brisbane owners and renters' reported changes in water use over time (owners mean = 2.34, renters mean = 2.59). Note that means were below the mid-point of the scale (i.e. stayed the same) and therefore both groups reported lower water use over time.

A significant difference emerged between Melbourne owners' and renters' reported change in water use (owners mean = 2.16, renters mean = 2.77):

→ owners reported decreasing their water use more than renters.

Comparison of household composition groups' reported changes in water use

In Brisbane, differences across household composition groups emerged on perceptions of changes in household water use.

→ Respondents in single and multiple adult households reported decreasing their water use more than family households (single adult mean = 2.32, multiple adult mean = 2.27, family mean = 2.72).

A similar pattern emerged for Melbourne respondents, although the difference was not significant (single adult mean = 2.10, multiple adult mean = 2.26, family mean = 2.50).

Comparison of household income groups' reported changes in water use

Significant differences across household income groups emerged among Brisbane respondents for water use:

→ Low-income household respondents reported decreasing water use more than medium or high-income households (low income mean = 2.23, medium income mean = 2.53, high income mean = 2.68).

Significant differences between household income groups did not emerge for Melbourne respondents.

3.8.1 Reasons for decreases in household water use

As Table 16 shows, the three most cited reasons for *decreased water use* among Brisbane respondents were:

1. The state of the environment.
2. Government regulation (e.g. water restrictions).
3. The commitment of the household to protecting the environment.

Awareness of ways to save water and changes in fittings and appliances were also cited by more than 30 per cent of Brisbane respondents.

The pattern for Melbourne was similar:

1. The state of the environment.
2. The commitment of the household to protecting the environment.
3. Awareness of ways to save water.
4. Government regulation.

Respondents were given the opportunity to cite other reasons than those on the list. Brisbane respondents cited as *other reasons for decreased use*: increased awareness by older children, installation of water tanks and changed place of residence. Among Melbourne respondents, other reasons included installation of water-efficient appliances (e.g. water tanks), changed practices such as not watering or bucket-watering garden, cutting costs out of necessity, moving to an apartment and identifying leaking pipes.

Results from the interviews largely accord with the survey data. According to interview participants, government regulation in the form of water restrictions was one of the major impetuses for change. One householder reported that prior to the introduction of water restrictions there was *no difference* to their behaviour. The restrictions had motivated householders who were *trying to do the right thing*.

It was also evident that government programs provided householders with ways to save water. Interviewees reported taking advantage of programs to replace old showerheads with new low-flow ones as a result of the various council programs. Many householders reported that if they were to change appliances in the future they were more aware of labelling information and would take the water rating into consideration in their purchase.

Consistent with the survey finding that commitment to protecting the environment was an impetus for change, interviewees spoke of their environmental concern and concerns about water availability: 'I think we are in real big strife'—as a major reason for implementing changes to their water use. Others had been influenced through societal norms, their awareness of the Australian climate and media reporting of dam levels.

> Saves the environment, I suppose…Just becomes the expected in society. All these people sitting out the front, hosing their garden, who don't have a sign saying bore water, well people do slow down and bloody look at you ….

It is interesting that cost did not emerge as a major impetus for change in the survey data but reducing costs was mentioned by interview participants as major impetus for implementing water-saving measures. For some this was the sole impetus, while others spoke of how initially there may have been a cost impetus but that this had changed and the behaviour had become more habitual.

3.8.2 Reasons for increases in household water use

For respondents who reported increasing their water use, the most cited reason was changes in the number of people in the house. Brisbane respondents also provided *other reasons* for their increased use, including: increased water use relating to new babies, leaking taps, inefficient appliances, new pool and water-using practices of children. *Other reasons* mentioned by Melbourne respondents included: water-using practices of children (e.g. teenagers showering more), increased showering relating to work conditions, and rental property with fittings that are not water-efficient.

Table 16: Percentage of respondents who cited a reason for changes in their water use

Reasons	Brisbane		Melbourne	
	Reasons for decreased use %	Reasons for increased use %	Reasons for decreased use %	Reasons for increased use %
The state of the environment (e.g. drought, rainfall)	50.7	32.3	54.1	34.0
The commitment of you/your household to protecting the environment	40.5	10.0	53.0	13.0
Government regulation (e.g. water restrictions)	50.1	16.9	47.5	14.0
Government information promoting water conservation	8.5	4.6	9.3	6.0
Government rebates for water-efficient appliances	12.2	3.1	4.1	10.0

Awareness of ways to save water around the home and garden	39.9	17.7	50.8	18.0
Changes in the number of people in the house	14.6	52.3	13.9	47.0
Changes in fittings and appliances in the home/garden (e.g. installing rainwater tank)	37.9	12.3	26.2	7.0
Change to the home or garden (e.g. house extension, landscaping, etc.)	7.0	22.3	6.6	13.0
The cost of water	15.5	18.5	12.0	26.0
Other	3.5	11.5	2.7	12.0

3.8.3 Reasons for consistent water use

For those respondents who reported that they *did not change their water use* over the past three years, the predominant reasons given by Brisbane respondents for their water use levels were:

→ awareness of ways to save water

→ the state of the environment

→ the number of people in the house

→ the commitment of the household to protecting the environment.

For Melbourne respondents, the main reasons (in order of nomination) were:

→ the number of people in the house

→ awareness of ways to save water

→ government regulation

→ the state of the environment.

Other reasons provided by Brisbane respondents included water inefficiency of current residence, personal commitment to conserving resources, use of rainwater tanks only, and the water use of other tenants when living in un-metered dwellings. Among Melbourne respondents, other reasons include the need to use water for health reasons and consciousness about saving water.

Table 17: Percentage of respondents who cited a reason for lack of changes in their water use

Reasons	Reasons given when reported water use did not change	
	Brisbane %	Melbourne %
The state of the environment (e.g. drought, rainfall)	42.6	36.9
The commitment of you/your household to protecting the environment	39.1	27.0
Government regulation (e.g. water restrictions)	34.8	39.6
Government information promoting water conservation	3.5	4.5
Government rebates for water-efficient appliances	4.3	5.4
Awareness of ways to save water around the home and garden	47.8	42.3

The number of people in the house	40.0	54.1
The fittings and appliances in the home/garden (e.g. installing rainwater tank)	31.3	18.0
The cost of water	20.9	19.8
Other	4.3	3.6

4 HOUSEHOLD ENERGY CONSERVATION

Listed in Table 18 below are the energy curtailment and efficiency actions that were presented to all participants prior to the survey questions asking about energy conservation.

Table 18: Energy curtailment and efficiency actions

Curtailment actions (everyday actions to save energy)	Efficiency actions (installation of energy-efficient devices)
Switch off unused appliances at power point	Solar hot water
Switch off unused lights	Solar panels
Use cold water in washing machines	Compact fluorescent lighting
Dry clothes on line rather than in dryer	Household insulation
Switch computers and electronic equipment off when not in use	Electronic equipment (e.g. DVDs, TVs, sound systems, computers, etc. that carry an Energy Star label)
Run air conditioners/heaters at efficient temperatures (18–21°C in winter, 23–26°C in summer).	White goods and appliances with Australian energy rating of four stars or above
Keep windows and doors closed when using air-conditioners	
Close curtains on hot summer days and cold winter nights	

4.1 Frequency of engaging in energy curtailment actions

The means in Table 19 demonstrate high mean levels of engagement in the energy curtailment actions for Brisbane and Melbourne respondents. Moreover, Figure 14 shows the percentage of respondents who reported that they always engage in these actions. These results suggest that for a majority of respondents the actions are habitual. The exceptions are switching off appliances at the power point and switching off computers and electronic equipment when not in use. Note that the percentages reflect the proportion of respondents for whom the behaviour is applicable; that is, the questions about air-conditioning are not applicable to those respondents who do not have air-conditioning.

Table 19: Mean energy curtailment behaviour for Brisbane and Melbourne respondents

Curtailment actions	Brisbane mean (SD)	Melbourne mean (SD)
Switch off unused appliances at power point	3.83 (1.08)	3.68 (1.11)
Switch off unused lights	4.63 (.65)	4.63 (.63)
Use cold water in washing machine	4.54 (.88)	4.29 (1.07)
Dry clothes on line rather than in dryer	4.58 (.77)	4.50 (.75)
Switch computers/electronic equipment when not in use	4.09 (1.04)	4.13 (1.02)
Run air-conditioners/heaters at efficient temperature	4.62 (.72)	4.48 (.78)
Keep windows and doors closed when using air-conditioners	4.88 (.41)	4.69 (.75)
Close curtains on hot days and cold nights	4.55 (.83)	4.75 (.60)

Note: Values ranged from 1 never to 5 always.

Figure 14: Percentage of respondents (for whom the behaviour is applicable) who report always engaging in these actions
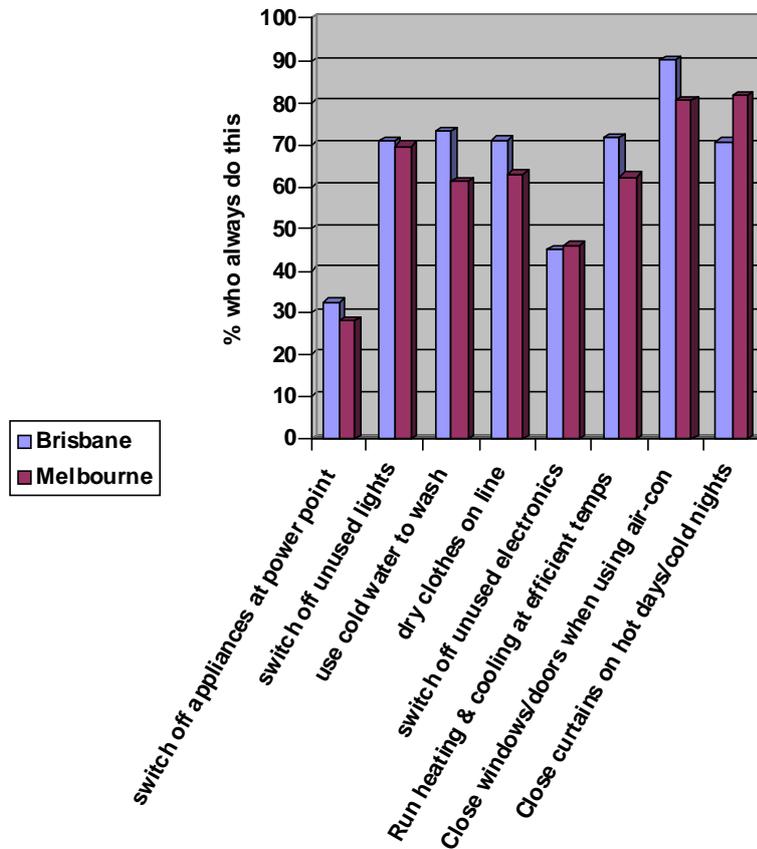
Comparison of renters and owners on energy curtailment actions

There were no significant differences between owners and renters in terms of their reported energy curtailment actions.

Comparison of household composition groups on energy curtailment actions

Table 20 shows the mean energy curtailment actions across household composition groups. In Brisbane, household composition groups significantly differed on:

→ switching off unused appliances

→ drying clothes on the line rather than in the dryer

→ switching off computers and electronic equipment at the wall.

Single-person households were more likely to switch off unused appliances compared to multiple adult or family households. Family households were less likely to dry clothes on the line rather than in the dryer and switch computers and electronic equipment off at the wall compared to single-person and multiple-adult households.

In Melbourne, significant differences emerged on

→ running air conditioners at efficient temperatures.

Family households were less likely to run air conditioners at an efficient temperature compared to single-person households.

Table 20: Means for each household composition type in Brisbane and Melbourne on energy conservation curtailment actions

Curtailment actions	Brisbane			Melbourne		
	Single adult	Multiple adults	Adults + children	Single adult	Multiple adults	Adults + Children
Switch off unused appliances	4.23	3.83	3.66	3.92	3.65	3.64
Switch off unused lights	4.70	4.68	4.54	4.69	4.65	4.58
Use cold water to wash	4.67	4.55	4.52	4.38	4.29	4.32
Dry clothes on line	4.76	4.66	4.49	4.71	4.56	4.44
Switch electronic computers off when not in use	4.24	4.18	3.91	4.28	4.15	4.05
Run air-conditioners at efficient temperatures	5.08	4.99	4.84	4.88	4.64	4.52
Keep windows and doors closed when using air-conditioners	5.30	5.19	5.12	5.12	4.90	4.90
Close curtains on hot summer days and cold winter nights	4.75	4.58	4.56	4.82	4.77	4.73

Comparison of household income groups on energy curtailment actions

Table 21 shows the mean energy curtailment actions across household income groups. Among Brisbane respondents, there were significant differences in:

→ running air-conditioners at efficient temperatures

→ drying clothes on the line rather than in a dryer

→ switching off unused lights

→ switching off unused appliances at power points.

Across all of these measures low-income households engaged in more of the actions than high-income households with medium-income households behaving more or less like the other groups depending on the behaviour. Although the differences did not reach the $P < 0.01$ level of significance, it was also clear that low-income households used cold water to wash, switched off electronic equipment and kept doors and windows closed when operating heating or cooling more often than high-income households.

Among Melbourne respondents, household income groups significantly differed in:

→ switching off unused appliances at power points.

As with Brisbane respondents, low-income households engaged in more of these actions than high-income households. A similar pattern emerged on using cold water to wash.

Table 21: Means for each household income type in Brisbane and Melbourne on energy conservation curtailment actions

	Brisbane			Melbourne		
Curtailment actions	*Low income mean*	*Medium income mean*	*High income mean*	*Low income mean*	*Medium income mean*	*High income mean*
Switch off unused appliances	4.01	3.80	3.46	3.84	3.59	3.40
Switch off unused lights	4.76	4.59	4.41	4.67	4.63	4.50
Use cold water to wash	4.63	4.61	4.35	4.36	4.34	3.96
Dry clothes on line	4.72	4.53	4.34	4.63	4.45	4.19
Switch electronic computers off when not in use	4.20	4.07	3.81	4.20	4.09	3.89
Run air-conditioners at efficient temperatures	4.74	4.59	4.42	4.51	4.49	4.31
Keep windows and doors closed when using air-conditioners	4.94	4.87	4.78	4.62	4.75	4.59
Close curtains on hot summer days and cold winter nights	4.61	4.55	4.55	4.72	4.77	4.67

4.2 Frequency of engaging in energy efficiency actions

As Figure 15 shows, a majority of Brisbane and Melbourne respondents reported that they had installed compact fluorescent lighting and household insulation and to a lesser extent energy-efficient electronics and white goods. Only a small percentage of respondents had installed solar hot water (Brisbane: 12.1%, Melbourne: 7.4%) or solar panels (Brisbane: 6.3%, Melbourne: 5.1%).

Figure 15: Percentage of respondents who have installed energy-efficient appliances
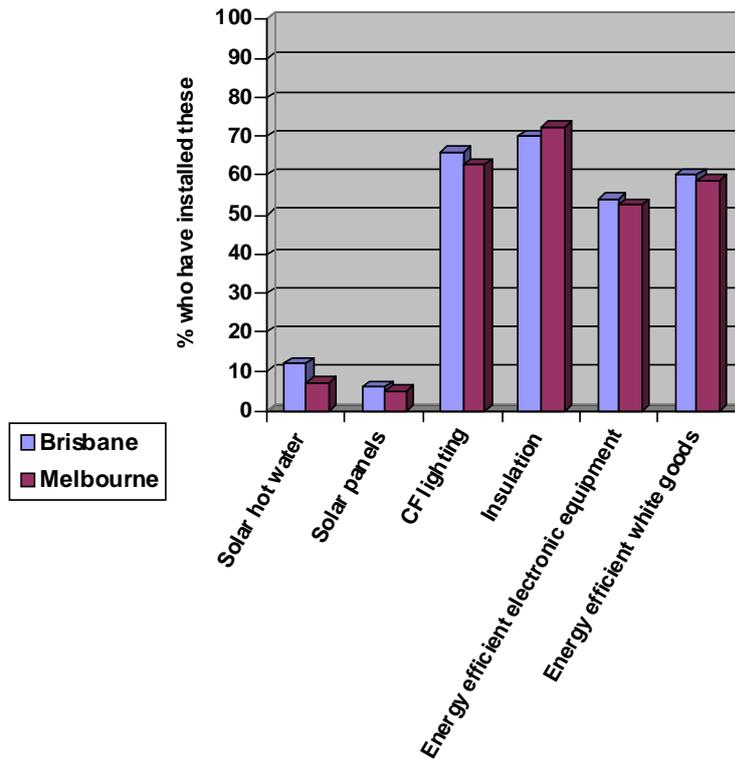
Comparison of owners and renters on installation of energy-efficient devices

Table 22 shows the percentage of householders who had installed energy-efficient appliances. Among Brisbane respondents, owners and renters significantly differed on:

→ installing compact fluorescent lighting

→ installing household insulation.

More owners had installed compact fluorescent lighting and household insulation than renters.

Among Melbourne respondents, significant differences between owners and renters emerged on:

→ installing compact fluorescent lighting

→ installing household insulation

→ installing white goods and appliances with four star Australian energy ratings or above.

More owners than renters had installed these energy-efficient appliances.

Table 22: Percentage of owners and renters who had installed energy-efficient appliances

	Brisbane		Melbourne	
	Owners %	Renters %	Owners %	Renters %
Solar hot water	12.4	11.6	8.0	6.0
Solar panels	6.7	5.5	5.6	3.6
Compact fluorescent lighting	70.1	57.3	66.5	53.0
Household insulation	79.9	49.7	82.4	47.0
Electronic equipment With energy star rating	57.0	48.2	55.3	45.2
White goods and appliances with four star Australian energy rating or above	62.2	56.3	63.5	47.0

Comparison of household composition groups on installation of water-efficient devices

Comparisons across household composition groups in Brisbane showed that there were no significant differences in terms of whether energy-efficient appliances had been installed in the home.

In Melbourne significant differences emerged on:

→ installing electronic equipment with energy star ratings.

Multiple-adult households were most likely to have installed this and family households were the least likely (single adult: 51.8%, multiple adult: 58.2%, family: 43.2%)

Comparison of household income groups on installation of water-efficient devices

There were no significant differences between Brisbane or Melbourne low, medium, and high-income households in terms of whether they had installed the energy-efficient appliances.

4.3   Intentions to install energy-efficient appliances

Those respondents who had not already installed the energy-efficient appliances indicated whether they intended to install them in the next six months. Table 23 shows that mean intentions were higher for installing electronic equipment with energy star rating or white goods and appliances with energy ratings of four or above than for installing solar hot water or solar panels. In the latter case the means fell between may not install and unsure.

Table 23: Mean intentions to install energy-efficient appliances over the next six months

Energy-efficient appliances	Brisbane mean (SD)	Melbourne mean (SD)
Solar hot water	2.56 (1.31)	2.44 (1.29)
Solar panels	2.54 (1.27)	2.49 (1.30)
Compact fluorescent lighting	3.33 (1.28)	3.04 (1.45)

Household insulation	2.93 (1.46)	3.52 (1.39)
Electronic equipment with energy star rating	3.58 (1.05)	3.50 (1.13)
White goods and appliances with four star Australian energy rating or above	3.70 (1.06)	3.54 (1.17)

Note: Values ranged from 1 Definitely will not install to 5 Definitely will install.

Comparison of owners' and renters' future intentions to install water-efficient appliances

Among Brisbane respondents there were significant differences between owners and renters in terms of their intentions to install:

→ solar panels.

Owners compared to renters had stronger intentions to install solar panels. It should be noted that although owners had stronger intentions than renters to install solar panels, the mean responses still fell below the mid-point of the scale, suggesting that they were unlikely to install these devices.

Among Melbourne respondents a significant difference emerged on intentions to install:

→ household insulation.

Owners had stronger intentions to install insulation than renters.

Comparison of household composition groups' future intentions to install water-efficient appliances

There were no significant differences in intentions to install energy-efficient appliances across household composition groups.

Comparison of household income groups' future intentions to install water-efficient appliances

There were no significant differences in intentions to install energy-efficient appliances across household income groups.

4.4   Predicting energy curtailment intentions

In the analyses relating to energy conservation intentions, past behaviour relating to air-conditioning (i.e. running air-conditioners at efficient temperatures, closing windows and doors when running air-conditioners) was not included in the third step of the analysis as these behaviours were not applicable to respondents who did not have air-conditioning. Beta weights once all of the variables are entered into the model are shown in Table 24.

Among Brisbane respondents the variables explained 58 per cent of the variance in intentions to engage in everyday actions to conserve energy (i.e. energy curtailment actions). The significant predictors of energy curtailment actions were dwelling type, past behaviour relating to switching off appliances at the wall and switching off lights when not in use, attitudes, subjective norms and self-efficacy. Brisbane respondents with stronger intentions to conserve energy in this way:

→ live in units or townhouses

→ report higher levels of switching off unused appliances at the wall and switching off unused lights

→ had more positive attitudes to curtailment actions

→ had a greater belief that important others supported saving energy in this way

→ and greater confidence that they could save energy in this way.

Among Melbourne respondents the variables explained 75 per cent of the variance in energy curtailment intentions. The significant predictors of intentions were age, tenure, past behaviour relating to switching off appliances at the wall, attitudes, subjective norms and self-efficacy. Melbourne respondents who had stronger intentions to save energy in this way were:

→ younger

→ home owners

→ who reported switching off unused appliances more at the power point

→ had more positive attitudes to saving energy through curtailment actions

→ had a greater belief that important others supported saving energy in this way

→ had greater confidence that they could save energy in this way.

Table 24: Significant predictors of energy conservation curtailment intentions for Brisbane and Melbourne respondents

Variables	Brisbane	Melbourne
Demographics	β	β
Gender	0.06	-0.01
Age	-0.04	-0.09*
Household tenure	-0.09	-0.07*
Household income	-0.05	-0.02
Level of education	0.00	-0.03
Dwelling type	-0.10*	0.02
Number in house	0.00	-0.08
Household composition	0.02	-0.01
Number of bedrooms	0.08	0.06
Size of garden	0.05	0.00
Past behaviour		
Switch off unused appliances at power point	0.10*	0.14***
Switch off unused lights	0.12*	0.02
Use cold water in washing machine	-0.01	0.02
Dry clothes on line rather than use dryer	-0.05	-0.01
Switch computers and electronic appliances off when not in use	-0.05	0.01
Close curtains on hot days and cold nights	-0.04	-0.02
TPB variables		
Attitudes	0.28***	0.34***
Subjective norms	0.22***	0.17***
Descriptive norms	0.03	0.05
Self-efficacy	0.31***	0.40***
Perceptions of control	0.01	0.01
Household level variables		

Variables	Brisbane	Melbourne
Household culture	0.02	-0.01

P < 0.05, ***P* < 0.01, ****P* < 0.001. Note. Betas represent final betas once all variables are entered into the model

4.4.1 Beliefs that underpin positive attitudes to energy curtailment actions

As noted above, attitudes were a significant predictor of energy curtailment intentions. According to the Theory of Planned Behaviour, our attitudes about energy curtailment actions are underpinned by beliefs about the advantages and disadvantages of engaging in these types of actions. The qualitative interviews specifically elicited householders' beliefs about the advantages and disadvantages of energy curtailment actions and therefore can provide insight into the factors that can help to shape householders' attitudes.

4.4.2 Advantages of energy-saving curtailment behaviour

Cost savings and environmental benefits

Most householders reported both cost savings and caring for the environment as the main advantages of energy-saving curtailment behaviour; however, the majority of households prioritised cost savings over environmental concerns:

> Well you not only save yourself money, you're helping the environment…We're not scungy, but financially you've got to try and do it. Then for the environment, you've got to try and do it … with the green house effects and our poor ozone layer which is depleted terribly.

Saving energy

Another common advantage of curtailment behaviours reported by householders was saving energy. To some this reflected the *practical* advantage of curtailment behaviours and that to do otherwise was simply a *waste*.

4.4.3 Disadvantages of energy curtailment behaviour

Inconvenience

The inconvenience of turning off unused appliances at the wall was the most commonly reported disadvantage of the curtailment behaviour. Many households commented on the inconvenience of having to turn off devices which were either difficult to reach and/or required resetting once turned off, including set-top boxes, DVD players and microwaves. Generally, turning off appliances was perceived as a *nuisance* and a *pain in the neck* and for one household it was perceived as a task, that in itself, would be *a 10 minute job to go around the whole place, upstairs and downstairs, turning off every single power point*. Householders were reluctant to turn devices off at the power point when it was something they were always 'busy' using.

4.4.4 Summary of advantages and disadvantages of energy curtailment actions

These results indicate that householders will have positive attitudes to energy curtailment actions if they perceive the financial and environmental benefits to outweigh the inconvenience that may be associated with some energy curtailment actions. As evidence that these beliefs are linked to behaviour, householders' self-reports of energy curtailment actions showed that turning off unused appliances at the power point was something that only a minority of householders did most or all of the time.

4.4.5 Beliefs that underpin confidence in engaging in energy curtailment actions

Another important predictor of energy curtailment intentions was how much confidence householders felt in their ability to engage in the actions. According to the TPB, this sense of confidence is underpinned by a set of facilitators and barriers that may be real or perceived.

4.4.6 Facilitators to energy curtailment behaviour

Habit

In many instances householders reported that everyday actions to save energy were already existing behaviours or habits that posed very little difficulty to doing them, particularly when it came to turning off unused lights, using cold water in washing machines, drying clothes on a line rather than a dryer, running air conditioners and heaters at optimum temperatures, keeping windows and doors closed when using air-conditioners and closing curtains on hot summer days and cold winter nights.

Cost of energy

The increasing cost of energy was reported as a factor motivating reduced energy use, even though encouraging households to use less energy was a preferred strategy:

> I'd prefer if they didn't increase and tried encouraging people to use less … I know it's worked for me because I am on my own; one income. So I have to think twice about how I can save money and be able to afford and pay the bills.

Media

One householder's behaviour had been 'triggered' by a media promotion:

> I did like the [TV advertisement] too about 'no one' – about turning off the appliances. That was probably one of the big triggers for me... It was a big fat man that was sitting down at a computer and she would come and turn the computer off. Don't leave the computer on for 'no one'. He was called 'no one' on his t-shirt.

Another householder recalled the 'Earth Hour' campaign which helped increase awareness of energy use in the household.

Education

Householders had been influenced by their children through education and also believed education had an important role to play in facilitating behavioural change:

> I think that the young people should be educated because my children, they know they should do it but they just don't bother, you know. They don't really try to have this habit. I've got the habit of doing it – they just don't care that much about this. So I think it should start from the younger people.

Household improvements

The more environmentally aware householders had improved their household's ability to save energy by making a 'relatively minor change' to the set-up of their

appliances by installing a power board with an on/off switch attached that makes turning appliances off at the source easy to do.

4.4.7 Barriers to energy curtailment behaviour

Behaviour of others

It was evident from householders' responses that children and spouses presented a significant barrier to curtailment behaviours:

> I go for this one, switch off unused appliances at the power point. I am for this always. I fight with my family all the time because I say why this television like now has to be switched on when it should be switched off. I hate it. I don't like anything on standby because I think you are wasting electricity so I always switch it off, and I tell my children but they don't listen often.

Some householders considered the future impact on the energy efficiency of their household as their children got older given the emphasis on electronic gadgets for children's entertainment:

> … we try not to have so much in the house. But I know we would be getting more, because …the older the kids get, the more electrical they have to buy, because that's what's out there now.

Habit

While for many householders turning off lights was something they had been doing for a very long time, turning off appliances had not become a habitual behaviour in the same way turning off lights had become. It was something householders reported they 'could do better if we wanted to'; something they needed to 'train' themselves to do better or to be 'reminded' to do, while other householders, in these instances referred to themselves as 'lazy' and 'slack':

> As far as switching off unused lights, I've been doing that ever since I was eight or nine… I'm a bit slack at [turning off appliances at the wall]… It's something I have to train myself to do better.

Comfort

Householders made their own choices about comfort and utility that often overrode household sustainability intentions:

> … I would rather be comfortable and use it the way I want to use it rather than…what's the point of having it otherwise, for me, if I'm not comfortable with it.

Health and hygiene

Householders sometimes prioritised health and hygiene over household sustainability intentions, particularly in the case of using warm or hot water rather than cold water washing. In these instances householders believed warm or hot water improved hygiene or increased cleaning power.

4.4.8 Summary of facilitators and barriers to energy curtailment actions

Findings from the interviews suggest 'good' habits, media reminders, pricing signals, education and technology that makes curtailment actions easier may facilitate and thus increase confidence in energy curtailment actions. The energy wasting actions of others in the household, the lack of 'good' habits, and concerns

about comfort and hygiene on the other hand, may act as barriers and reduce confidence.

4.4.9 Developing supportive social norms for energy conservation actions

Another key predictor of energy curtailment intentions (and efficiency intentions—see below) were perceptions of whether important others supported these types of actions. From a TPB perspective, our perceptions of normative support are underpinned by an assessment of how much salient others approve or disapprove of the behaviour. When asked if there were any individuals who approved or disapproved of their energy-saving action most people commented on responses by family and friends or those living in close proximity.

In the main, householders reported that very few people would disapprove and while few had engaged in discussion with others about their actions, there was a common perception that most were or would be approving, and that friends 'have similar attitudes' or colleagues 'agreed' with their energy-saving actions.

Some householders reported discussing issues with their work colleagues and one householder mentioned that environmental groups would approve, and that 'schools are encouraging' and 'kids always give you good feedback if you're efficient'.

On the other hand, it was evident from some of the interactions between spouses and partners that one or the other disapproved of some curtailment actions, such as leaving a room for only a minute only to come back and find that the light had been switched off, or switching off appliances that one or the other used such as the TV or the microwave or the computer.

One or two householders mentioned that they were probably seen to be 'greener' in their behaviours as if this was viewed in a negative way. However, in the main householders believed they were not 'doing anything wrong' and of others, one householder commented 'they know I am trying'.

4.5 Predicting energy efficiency intentions

In the following analyses past behaviour was measured with the energy efficiency index which is a measure of the number of energy-efficient devices that respondents had installed in their home. Beta weights once all of the variables are entered into the model are shown in Table 25.

Among Brisbane respondents the variables explained 65 per cent of the variance in energy efficiency intentions. The significant predictors of energy efficiency intentions were household tenure, the number of energy efficiency appliances in the home, attitudes, subjective norms, descriptive norms and self-efficacy. Brisbane respondents who had stronger intentions to conserve energy through installing energy-efficient appliances were:

→ home owners

→ had installed more energy-efficient devices in their homes

→ had more positive attitudes to energy efficiency actions

→ a greater belief that important others supported these actions

→ a greater belief that the community saved energy in this way

→ greater confidence that they could save energy through efficiency actions.

Among Melbourne respondents the variables explained 61 per cent of the variance in intentions to save energy through installing energy-efficient devices. The significant predictors of intentions were the number of energy-efficient appliances in the home, attitudes, subjective norms and self-efficacy. Thus, Melbourne respondents with stronger energy efficiency intentions had:

→ installed more energy-efficient appliances in their home in the past

→ more positive attitudes to saving energy in this way

→ a greater belief that important others supported these actions

→ greater confidence that they could save energy through efficiency actions.

Table 25: Significant predictors of energy conservation efficiency intentions for Brisbane and Melbourne respondents

Variables	*Brisbane*	*Melbourne*
Demographics	β	β
Gender	0.01	-0.01
Age	0.02	0.03
Household tenure	-0.10*	0.01
Household income	-0.04	-0.02
Level of education	0.06	0.07
Dwelling type	-0.03	0.04
Number in house	0.05	0.00
Household composition	-0.03	-0.03
Number of bedrooms	-0.07	-0.04
Size of garden	-0.07	-0.03
Past behaviour		
Energy efficiency index	0.13***	0.09*
TPB variables		
Attitudes	0.19***	0.15**
Subjective norms	0.34***	0.24***
Descriptive norms	0.10**	0.00
Self-efficacy	0.28***	0.44***
Perceptions of control	0.04	0.03
Household level variables		
Household culture	-0.05	0.03

** $P < 0.01$, ***$P < 0.001$ Note. Betas represent final betas once all variables are entered into the model.

4.5.1 Beliefs that underpin positive attitudes to energy efficiency actions

As with energy curtailment actions, attitudes were a significant predictor of energy efficiency intentions. The qualitative interviews provide insight into the beliefs that underpin efficiency attitudes.

4.5.2 Advantages of energy efficiency behaviour

Householders did not readily distinguish advantages of energy-efficient installations from those related to energy curtailment actions. Therefore, the perceived advantages were similar: cost and energy savings and environmental concern. One householder who had moved into a rental property that had solar hot water installed had experienced a reduction in their energy costs as a result.

> I could see the benefit in it because we found that when we first moved in here our power bill actually went down a bit. It wasn't a huge amount but it went down a bit and I was glad for that.

4.5.3 Disadvantages of energy efficiency behaviour

Cost

The most commonly reported disadvantage of installing energy-efficient appliances was cost, particularly the costs of more expensive appliances such as installing solar power and solar hot water systems. However, some households even needed to consider the costs of energy-efficient lighting:

> We've changed the lights… they're the power saving except these two. Because they're about $9 each which is very expensive. We missed out. I think local government or Bendigo Bank were doing some sort of thing, where you could ring them up and they'd come out and replace your globes. Pretty much everything is the energy saving lights, except these two.

In terms of white goods, some households said they were limited by costs and while they would aim to purchase the highest energy-rated appliance, cost would ultimately dictate the purchase of a product.

> If you had a choice of two products that look the same, did basically the same thing, and one was dearer and one was cheaper I'd go for the cheaper one.

Others commented that if the cost margin was only small between one product and another that had a better energy rating, then they would seriously consider purchasing the better energy-rated product.

Value for money

A number of households believed there was little value for money in purchasing expensive items such as solar power and or hot water systems. Their concerns centred on whether they would recoup their costs and whether it would reduce their future purchasing power.

> We haven't got solar hot water. Once again, it's – it'd be a good idea, but they're so expensive to purchase and install that you have to use it for decades before you finally recoup the costs.

Matching need to design

Purchasing a better energy-rated product was also qualified by matching design to need with the latter taking priority over the former, for example preferences for a particular size of fridge or washing machine.

Effectiveness

One disadvantage raised by householders was the perceived reduced effectiveness of the product. This was raised in the context of poor light from

energy-efficient bulbs. Another householder believed that solar electricity and water systems were still [technologically] underdeveloped and their efficiency was highly dependent on the levels of sunlight available and as such these systems were more efficient located 'out west'.

4.5.4 Summary of advantages and disadvantages of energy efficiency actions

It is clear that economic and functionality considerations are key factors underpinning householders' decisions about whether to purchase and install some energy-efficient appliances. To the extent that appliances are perceived to be expensive, not highly functional and not capable of quickly recouping their investment, householders may have less positive attitudes to them. The levels of solar panel and solar hot water installations in homes in this sample provide evidence of the effects of these negative attitudes.

4.5.5 Beliefs that underpin confidence in installing energy-efficient appliances

Householders who reported greater confidence in their ability to install energy-efficient appliances had greater intentions to install these devices. The interviews identify the facilitators and barriers that may underpin feelings of confidence.

4.5.6 Facilitators of energy efficiency behaviour

Often householders spoke of having taken advantage of government programs such as replacement of energy-efficient lighting and household energy audits that contributed to their household energy efficiency. Others reiterated the role of government in leading *initiatives* that would facilitate change.

Decrease costs of products

For some households it was government transparency and reduced costs that would facilitate improved energy-efficient behaviour:

> … a better way would be to actually make the people want to do something. So rather than propagating lies or increasing costs – make the energy-efficient products much cheaper and that way the people can afford them and will want to go to the cheaper alternative, which in turn will be much more efficient and effective.

Government assistance for low-income households

Some low-income households believed the government could do more to ensure public housing properties were better equipped to ensure efficient energy use.

> … why doesn't the Government turn around and help us low-income families … with all the main things that can help save the energy and of course get us on the right track with conserving. You know solar panels for instance that would be a bonus that would knock my bill down…even insulation, there's no insulation in this house. We get the breezes all the time.

Labelling

Labelling had often played an important role in householders' selection of energy-efficient appliances and fittings and where householders spoke of replacing appliances in the future, the majority reported, although qualified by cost considerations, that they would be seeking products with as high a rating as they could afford.

Banning the import of energy-inefficient products

It was suggested that banning the import of energy-inefficient products would assist household sustainability practices:

> … there are a number of imports of appliances that are very low energy performance. They've only really started on the air conditioners but that's where they should be targeting those ones … stopping the importation of non-energy-efficient appliances).

4.5.7 Barriers to energy efficiency behaviour

Tenure

Private rental householders were less inclined to install energy-efficient appliances where installation was either out of their control or of no value to install. Householders currently in private rental referred to previous and future home ownership arrangements where they had either installed appliances or where they planned to install various appliances.

Public housing tenants reported being much more dependent on the actions of the housing authority in terms of energy efficiency measures. Over and above barriers associated with the costs of appliances for low-income public housing tenants, their tenure made installing energy-efficient appliances out of their control.

> Well I wish they had installed the solar because they were thinking of doing it but they're not. The same as insulation in the roof. They said that they were going to but I don't know that they are now and I'm really disappointed about that. But then I don't have any choice.

Unaware of product labelling

It was clear that while most households were familiar with energy rating labelling on white goods, although some admitted taking little if any notice of labelling in the process of purchasing, fewer households were aware of the same on electronic equipment.

Government programs and rebates

Some households' decisions to install energy-efficient appliances were influenced by eligibility requirements relating to rebates. For example, one household was outside of the income eligibility for the rebate and despite being on a high income this was a significant setback to their intention to install solar power.

Another household had had a series of negative experiences in accessing a number of rebates. They had missed out on installing solar electricity as the rebate was 'pulled' despite having paid a deposit; they were assessed as ineligible for solar hot water rebate as they had gas and the rebate eligibility was only directed to households who already had electric power; they were assessed as ineligible for the ceiling insulation on the basis that they already had insulation despite the insulation being at least 30 years old and in need of replacement.

Product 'fit'

There were some circumstantial reasons preventing householders installing energy-efficient appliances and products, such as properties located in too much shade to be able to install solar panels, lights with dimmers that are unsuitable for the energy loads of compact fluorescent lightning, and in another case the design

of the product such as compact fluorescent lighting was perceived as unsuitable in the context of the house décor.

4.5.8 Summary of facilitators and barriers to energy efficiency actions

The interviews highlight a range of facilitators or barriers that may motivate or undermine householders' confidence in installing energy-efficient appliances. Decreasing the costs of energy-efficient products, energy-efficient labelling and government assistance may raise confidence. On the other hand, a lack of awareness about labelling, living in rental accommodation, government programs and rebates that don't work, and a lack of fit between the environment and the product could undermine confidence. From a policy perspective it is interesting that householders suggested the restriction of energy-inefficient appliances.

4.6   Predicting past energy curtailment actions

Beta weights once all of the variables are entered into the model are shown in Table 26. Among Brisbane respondents, the variables accounted for 33 per cent of the variance in the energy curtailment behaviours. The significant predictors were attitudes, subjective norms, descriptive norms and household culture. Respondents who reported engaging in more energy curtailment actions in the past had:

→ more positive attitudes toward energy curtailment actions

→ a greater belief that important others supported these actions

→ a greater belief that others in the community engage in these actions

→ perceived a stronger culture of environmental sustainability in the household.

Among Melbourne respondents, the variables accounted for 29 per cent of the variance in energy curtailment behaviours. The significant predictors were attitudes, subjective norms and household culture. Melbourne respondents who reported engaging in more energy curtailment actions had:

→ more positive attitudes toward energy curtailment actions;

→ a greater belief that important others supported these actions;

→ perceived a stronger culture of environmental sustainability in the household.

4.7   Predicting past energy efficiency actions

Beta weights once all of the variables are entered into the model are shown in Table 27. Among Brisbane respondents the variables accounted for 19 per cent of the variance in whether energy efficiency appliances had been installed. The only significant predictors of past energy efficiency actions were self-efficacy and household culture. Respondents who had installed more energy-efficient appliances in the past:

→ had greater confidence that they could save energy by installing efficient devices

→ perceived a stronger culture of environmental sustainability in their homes.

Among Melbourne respondents the variable accounted for 24 per cent of the variance in whether energy-efficient appliances had been installed in the home. The only significant predictors to emerge were age and number of bedrooms. Melbourne respondents who reported installing more energy-efficient appliances in their home were:

→ older

→ had larger homes.

Table 26: Significant predictors of energy curtailment behaviours for Brisbane and Melbourne respondents

Variables	Brisbane	Melbourne
Demographics	β	β
Gender	-0.01	0.01
Age	-0.01	0.02
Household tenure	-0.04	0.10
Household income	-0.03	0.01
Level of education	-0.10	-0.08
Dwelling type	-0.06	0.07
Number in house	-0.10	0.05
Household composition	0.03	0.07
Number of bedrooms	0.06	-0.02
Size of garden	0.03	-0.06
TPB variables		
Attitudes	0.17*	0.19**
Subjective norms	0.26***	0.21**
Descriptive norms	0.12*	-0.02
Self-efficacy	0.03	0.10
Perceptions of control	-0.01	-0.09
Household level variables		
Household culture	0.17**	0.23***

P < 0.05, **P < 0.01, ***P < 0.001. Note. Betas represent final betas once all variables are entered into the model.

Table 27: Significant predictors of energy efficiency for Brisbane and Melbourne respondents

Variables	Brisbane	Melbourne
Demographics	β	β
Gender	-0.01	0.07
Age	0.00	0.28***
Household tenure	-0.11	0.00
Household income	-0.08	0.03
Level of education	-0.01	0.10
Dwelling type	-0.03	0.09
Number in house	-0.14	-0.12
Household composition	-0.04	-0.08
Number of bedrooms	0.11	0.18*
Size of garden	0.04	-0.05
TPB variables		

Attitudes	-0.07	-0.03
Subjective norms	0.16	0.13
Descriptive norms	0.01	-0.02
Self-efficacy	0.19*	0.13
Perceptions of control	0.07	0.09
Household level variables		
Household culture	0.18*	0.11

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$. Note. Betas represent final betas once all variables are entered into the model.

4.8   Changes in household energy use

The percentage of respondents who indicated whether their energy use had decreased, stayed the same or increased is shown in Figure 16. It is clear that the majority (Brisbane: 56.9%; Melbourne: 54.5%) of respondents reported that their energy use had stayed the same or increased.

Figure 16: Percentage of responses to the question of whether energy use had changed during the past three years
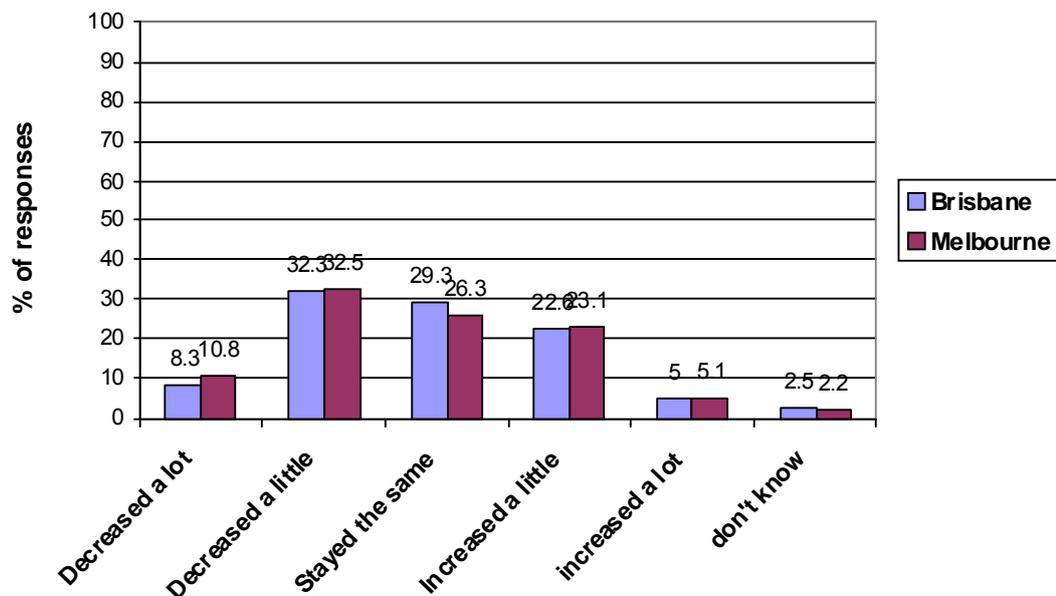
According to the interviews the main change reported by householders was an increase in curtailment behaviours such as turning off lights and switching appliances off at the wall. However, it was evident that the latter was a more recent behaviour and while there was an increased awareness of the behaviour and the benefits of doing it, it had not yet become a habit.

However, there were many householders who reported that other curtailment actions listed were already everyday actions, and/or were actions that householders had been doing for a very long time, in particular switching off lights or always washing with cold water. Other households reported that they had not made some of the more commonly reported changes such as changing to compact fluorescent lighting.

The other major change was an increase in awareness of energy-saving behaviours such as turning off lights and appliances at the wall, drawing curtains

and energy ratings. This finding is consistent with the survey data (see below) that shows that awareness of ways to save energy was the main reason cited for decreased energy use.

Few households reported an increase in installing energy-efficient appliances over a three-year period, often as a result of having older appliances that were still in working order and not ready for replacing as yet. However, householders did report a change in their awareness of energy rating labelling, particularly labelling on white goods more so than on electronic equipment.

One householder spoke of changing behaviour as a step-by-step process, commenting that changing to energy-efficient lighting was the 'first step'.

More than several householders had made the move to 'green power' as a means of improving their household's sustainability. This was a step householders were prepared to take despite the increased cost of energy under this scheme. In one instance a low-income household had to revert back to coal-fired energy source due to the 'exorbitant' increase in costs for green energy.

The major benefit reported by one householder who had switched to green energy was that they now thought less about the environment than had they still been on coal-fired energy and that they were able to 'switch things on and not feel guilty'.

Comparison of owners' and renters' reported changes in energy use

Among Brisbane respondents, owners and renters did not significantly differ in their judgement of whether their household energy use had increased or decreased over the past three years.

Among the Melbourne respondents there was a significant difference between owners and renters on changes in energy use: owners (mean = 2.70) reported decreasing their energy use more than renters (mean = 3.02).

Comparison of household composition groups' reported changes in energy use

In Brisbane, significant differences across household composition groups emerged on perceptions of changes in energy use. Respondents in single and multiple-adult households reported decreasing their energy use more than family households (single person mean = 2.57, multiple adult mean = 2.71, family mean = 3.15). A similar pattern emerged for Melbourne respondents, although the differences were not significant (single person mean = 2.59, multiple adult mean = 2.74, family mean = 2.96).

Comparison of household income groups' reported changes in energy use

There were no significant differences across Brisbane or Melbourne household income groups on perceptions of changes in their energy use.

4.8.1 Reasons for decreased energy use

As Table 28 shows, the predominant reason provided by Brisbane and Melbourne respondents for decreased energy use was:

→ awareness of ways to save energy around the home.

The other most cited reasons among Brisbane respondents were:

→ changes in fittings and appliances in the home

→ the commitment of the household to protecting the environment

→ the cost of energy.

Among Melbourne respondents, the other most cited reasons for decrease energy use were:

→ the commitment of the household to protecting the environment

→ changes in fittings and appliances

→ the state of the environment

→ the cost of energy.

Brisbane respondents mentioned installing solar panels or solar hot water, or moving house as *other reasons* for decreased use. Among Melbourne respondents, *other reasons* include the need to save energy because of low income, moving into an apartment and repairing broken appliances.

The findings of the interviews accord with the survey data. Householders reported increased awareness about the environmental impacts of everyday actions as a change, while others reported that the need to replace old appliances coupled with a desire to save energy led to installation of more energy-efficient appliances. Reducing costs was a common driver behind householder changes in energy-saving behaviour. One household commented that it was his/her personal circumstances, such as the children leaving home, that had brought about changes rather than any conscious act of changing habits.

4.8.2 Reasons for increased energy use

The most cited reasons for increases in energy use were changes in the number of people in the house, changes in fittings and appliances and the cost of energy. The latter reason is interesting; it perhaps suggests that people may be paying lower costs for energy. The other reasons provided for increased energy use among Brisbane respondents include new babies and increased family size, spending greater time in the home (e.g. because of new baby, unemployment), children getting older (and thereby using more water), overcharging of energy in rental units, energy company doing estimated readings, increased number of appliances, inefficient appliances in rental properties, health reasons, a new pool, time factors, use of heaters and high use of electronic devices. The reasons given by Melbourne respondents were very similar. In addition, Melbourne respondents mentioned the presence of older children and the (lack) of commitment of children, the behaviour of housemates, starting a home business and greater use of ducted heating and air-conditioning.

Table 28: Percentage of respondents who cited a reason for changes in their energy use

Reasons	Brisbane		Melbourne	
	Reasons for decreased use %	Reasons for increased use %	Reasons for decreased use %	Reasons for increased use %
The state of the environment (e.g. climate change)	20.5	22.9	35.0	26.3
The commitment of you/your household to protecting the environment	45.1	8.4	52.1	10.2
Government information promoting	16.8	4.8	17.9	6.6

energy conservation				
Government rebates for energy-efficient appliances (e.g. solar, insulation)	19.3	3.6	5.1	6.0
Awareness of ways to save energy around the home and garden	61.5	12.7	62.3	16.2
Changes in the number of people in the house	22.1	55.4	23.0	46.7
Changes in fittings and appliances in the home/garden	47.1	40.4	38.1	32.9
Change to the home or garden (e.g. house extension)	1.2	19.3	2.7	11.4
The cost of energy	42.2	39.2	32.3	41.3
Other	2.0	13.3	1.9	13.8

4.8.3 Reasons for consistent energy use

Of those respondents who reported that their energy use had not changed, the most common reason provided for their usage was awareness of ways to save energy (see Table 29). Other highly cited reasons include the fittings and appliances in the home, the cost of energy, the number of people in the home and the commitment of the household to protecting the environment. *Other reasons* provided for energy use were health reasons, lack of change in energy costs, engaging in practices that conserve energy, and personal commitment to conserving resources and reducing costs and weather conditions.

Table 29: Percentage of respondents who cited a reason for lack of changes in their energy use

Reasons	Reasons given when reported water use did not change	
	Brisbane %	Melbourne %
The state of the environment (e.g. climate change)	20.5	19.2
The commitment of you/your household to protecting the environment	33.0	35.3
Government information promoting energy conservation	10.8	13.5
Government rebates for energy-efficient appliances	10.8	12.2
Awareness of ways to save energy around the home	52.3	58.3
The number of people in the house	35.8	35.3
The fittings and appliances in the home	45.5	44.2
The cost of energy	42.0	35.3
Other	4.0	2.6

5 HOUSEHOLD WASTE MINIMISATION

After responding to questions about household water and energy conservation, participants then completed a series of questions focused on waste minimisation. The actions presented to participants prior to answering the questions are shown in Table 30 below.

5.1 Frequency of engaging in waste minimisation

The mean levels of waste minimisation actions suggest that respondents engage in these actions less than they do water or energy efficiency actions. Moreover, Figure 17 shows that reusing plastic bags is the only practice that a majority of the sample report that they always engage in.

Table 30: Mean past waste minimisation behaviour for Brisbane and Melbourne respondents

Waste minimisation actions	*Brisbane mean (SD)*	*Melbourne mean (SD)*
Use own bags when shopping	3.68 (1.14)	3.85 (1.07)
Choose products with less packaging	3.43 (.97)	3.54 (1.03)
Choose products with recyclable/reusable packing	3.42 (.98)	3.60 (1.03)
Reduce packaging by buying in bulk	3.31 (1.05)	3.39 (1.09)
Buy concentrated products	3.62 (.97)	3.69 (.99)
Avoid disposable products	3.52 (.98)	3.55 (1.00)
Say no to unnecessary plastic bags or packaging	3.87 (1.01)	3.96 (1.07)
Reuse plastic bags	4.57 (.79)	4.59 (.76)
Buy goods that you don't need	2.37 (.97)	2.40 (1.10)

Note. Values ranged from 1 never to 5 always.

Figure 17: Percentage of respondents who always (or never in the case of buying goods you don't need) engage in these actions
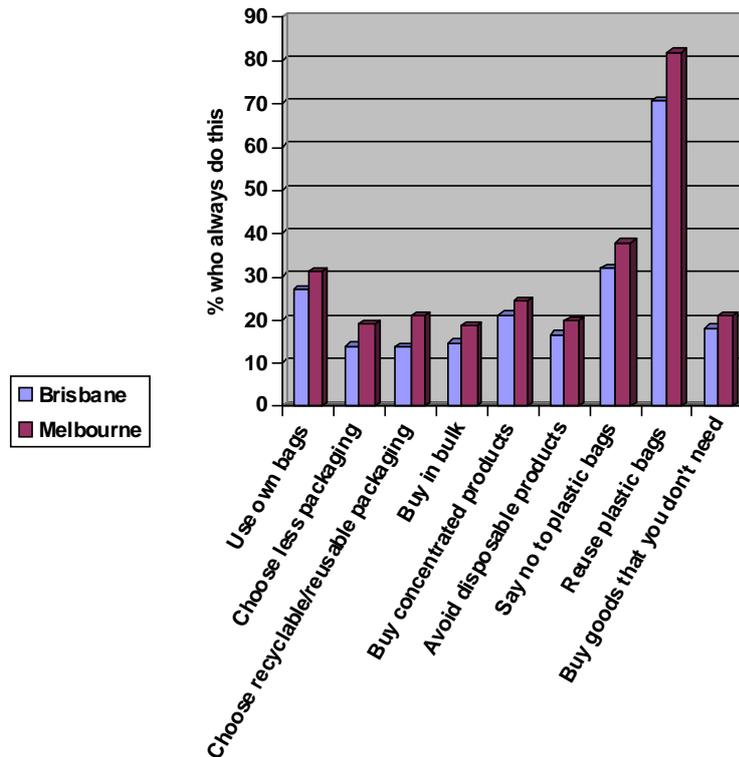
Comparison of owners and renters on waste minimisation actions

There were no significant differences among Brisbane owners and renters on the nine waste minimisation actions. Among Melbourne respondents, significant differences emerged on:

→ reusing plastic bags

→ buying goods you don't need.

Owners reported reusing plastics bags more than renters (owners mean = 4.65, renters mean = 4.46) and renters reported buying goods that they don't need more often than owners (owners mean = 2.32, renters mean = 2.57).

Comparison of household composition groups on waste minimisation actions

In Brisbane the only significant difference between household composition groups was on:

→ using their own bags when shopping.

Multiple-adult households reported using their own bags when shopping significantly more than single-person or family households (single person mean = 3.43, multiple adult mean = 3.85, family mean = 3.57).

In Melbourne, there were no significant differences between household composition types in their waste minimisation actions.

Comparison of household income groups on waste minimisation actions

The only difference to emerge for household income groups was for Brisbane respondents on:

→ using own bags when shopping.

Low-income households (mean = 3.89) were more likely to take their own bags shopping than medium (mean = 3.63) or high-income (mean = 3.45) households.

5.2 Predicting waste minimisation intentions

Results of the regression analysis are displayed in Table 31. Among Brisbane respondents the variables explained 75 per cent of the variance in intentions to minimise waste through the range of actions provided to respondents. The significant predictors of intentions were age, the extent to which respondents used their own bags when they shop, buy concentrated products, avoid disposable items, attitudes subjective norms, self-efficacy and household culture. Thus, Brisbane respondents with stronger intentions to minimise their waste:

→ Were younger.

→ Had engaged in more waste minimisation behaviour in the past (used own bags, bought concentrated products, avoided disposable items).

→ Had more positive attitudes to these actions.

→ Had greater belief that important others supported minimising waste in this way.

→ Perceived that they were part of a household with a stronger culture of environmental sustainability.

Among Melbourne respondents the variables explained 68 per cent of the variance in intentions to minimise waste through the range of waste minimisation actions. The significant predictors of intentions were dwelling type, attitudes, subjective norms, self-efficacy and household culture. Thus, Melbourne respondents who had stronger intentions to engage in waste minimisation actions:

→ Lived in free-standing houses.

→ Had more positive attitudes to these actions.

→ Had greater belief that important others supported minimising waste in this way.

→ Had greater confidence that they could engage in the actions.

→ Perceived that they were part of a household with stronger culture of environmental sustainability.

Table 31: Significant predictors of waste minimisation intentions for Brisbane and Melbourne respondents

Variables	Brisbane	Melbourne
Demographics	β	β
Gender	0.00	-0.01
Age	-0.06*	-0.03
Household tenure	0.02	-0.04
Household income	-0.05	0.03
Level of education	0.03	0.01
Dwelling type	-0.04	0.07*
Number in house	-0.00	0.02
Household composition	0.03	0.04

Variables	Brisbane	Melbourne
Number of bedrooms	0.03	0.03
Size of garden	-0.00	-0.02
Past behaviour		
Use own bags	0.08**	0.04
Choose products with less packaging	0.03	0.08
Choose products with recyclable/reusable packaging	-0.04	0.05
Buy in bulk to reduce packaging	0.03	0.01
Buy concentrated products	-0.09**	-0.03
Avoid disposable products	0.09*	0.04
Say no to unnecessary plastic bags	0.03	-0.04
Reuse plastic bags	0.03	-0.01
Buy less goods that you don't need	-0.00	-0.04
TPB variables		
Attitudes	0.31***	0.32***
Subjective norms	0.28***	0.24***
Descriptive norms	0.03	0.02
Self-efficacy	0.25***	0.27***
Perceptions of control	0.01	-0.01
Household level variables		
Household culture	0.07*	0.08*

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$. Note. Betas represent final betas once all variables are entered into the model.

5.2.1 Beliefs that underpin positive attitudes to waste minimisation actions

Consistent with the findings for water and energy conservation intentions, attitudes were also a significant predictor of waste management intentions. The results of the qualitative interviews provide insight into the beliefs that underpin attitudes, that is, the advantages and disadvantages of engaging in these actions.

5.2.2 Advantages of waste minimisation behaviours

Environmental benefits

The main advantage reported by householders of using their own bags, avoiding disposable products, and saying 'no' to unnecessary bags, was the environmental benefit. Households participated in these actions in an effort to 'save the resources'.

> In personal inconvenience there's no real difference but because we do think about the environment we use our own bags or if we don't have them with us for some reason or the other they ask us if we want a bag and we say it's okay, we'd rather walk with arms full.

> I do avoid the disposable products. I try to use crockery or glass as much as possible. One of the advantages I know of that is that with the whole cost of melting it down and the emissions…that I've been becoming aware of.

Householders were of the view that 'the less you put out the better' and believed their actions to be the 'right thing' to do and that they had a responsibility to 'look after the environment'. One household reported the action of using their own bags made them:

> Feel really good because…you carry them around and it's very evident to other people that you're using these things.

Choosing products with less packaging was commented on less; however for those who did, the major benefit was also environmental, with excess packaging viewed as 'pointless' and in the case of purchasing vegetables, packaging was seen as an 'unnecessary' act that compromised product quality and reduced individual choice.

> Choosing products with less packaging, I do that. I can't stand … especially vegetables and putting them in bags … they sweat and it's just unnecessary I think … I like to choose my food, not someone choose it and put it in the plastic and I have to buy what's there.

In the case of buying concentrated products, bulk buying and choosing products with recyclable/reusable packaging, householders often acknowledged environmental benefits as secondary to the cost benefits.

Cost savings

Householders often reported the primary benefit of buying in bulk or buying concentrated products was for the associated cost savings:

> We don't buy bulk to reduce on packaging. We buy bulk mainly to save money. I don't get any argument on that one.

Cost savings were also associated with reusing plastic bags as it saved households from purchasing other bags, in particular garbage bags. The majority of households reused the plastic shopping bags, mainly in lieu of garbage bin bags but also for storing craft materials, or for flea market or school-related activity.

Quality of products

Often quality was the major benefit of purchasing concentrated products; however, the environment still factored in householders' responses:

> Interviewee 1: I think because they are good. I just find them good quality.

> Interviewee 2: Some are biodegradable as well, so you might pay a little bit extra but it doesn't really matter.

5.2.3 Disadvantages of everyday actions to reduce waste

Cost, quality and convenience of material bags

The cost of the bags was reported to be quite expensive, particularly when purchasing quite a few and it was suggested that more people would be interested in using the bags if they were cheaper to buy. The quality of bags and hygiene concerns were also raised as a disadvantage of using one's own bags.

Using one's own bags was viewed as inconvenient when also carrying small children. The plastic bags could be better managed in these circumstances as their size and weight could be adjusted; however, the size and bulk of material bags made this more difficult.

Cost of products

There was a perception among one or two householders that the cost of buying products that were environmentally friendly was higher than non-sustainable products. Another household commented that they would not compromise the ability to look after their family because of increased costs related to waste reduction behaviours.

> Interviewee 1: There's got to be a balance between how far you go with this and that. Its good saying, yes, we've got to look after the environment. But then also, you can't go too far in a sense, because I can look after the environment but I'm not looking after my family and myself. So in the long run I'm not looking after the environment because I'm making a mess of it.

> Interviewee 2: We can look after the environment but, at the same, we don't want to compromise paying so much more money because of this or be penalised for it.

Cost was also a barrier in terms of households being able to bulk purchase.

Inconvenience

One or two households reported on the inconvenience associated with not using disposable products.

5.2.4 Summary of advantages and disadvantages of waste minimisation actions

The interview data suggest that householders with more positive attitudes are likely to be those who perceive the environmental benefits of the actions and products and also perceive cost and quality benefits. Householders with more negative attitudes are likely to be those who perceive that the actions and products are costly, inconvenient and that the quality of products is less than of other products.

5.2.5 Beliefs that underpin confidence in waste minimisation actions

The interview results can also provide insight into the factors that may influence householders' sense of confidence in their ability to engage in waste minimisation actions.

5.2.6 Facilitators of waste minimisation actions

Ease and habit

When presented with the list of everyday actions to reduce waste, it was evident that the most common and easiest actions for householders were using one's own bags when shopping and reusing plastic bags. Many of the actions on the list were considered by some householders to be small and easy to do:

> They're not – all these type of things, they're smaller things to reduce waste. They're not major things. I think its things that everyone can do… We do most of these, and I don't find it difficult at all.

> It's such a habit now. I always grab them out of the car if we're at a shopping centre. I don't just use them for groceries; I use them everywhere, shoe shop, wherever.

Quality and convenience of material bags

In contrast to the comments by some householders about the disadvantages of reusable bags, some people mentioned that the quality and convenience of using

material bags made it easy for them to use their own bags. They regarded their own bags as 'safer', 'cleaner and tidier', and 'stronger'.

Incentives to use one's own bags

Providing incentives or prompts was also reported as a strategy that would facilitate use of one's own bags. Several householders believed businesses should implement a similar strategy like that used at outlets (e.g. Aldi) where bags are not offered or only at a cost to the shopper. Householders reported that knowing Aldi did not supply bags provided a prompt for householders to take their own. Householders did not mind this approach as it 'forced' them to seek alternatives.

Adopting a user pays policy was also regarded as beneficial, such as exists in South Australia.

Using one's own bag or saying no to a bag was also made easier by the messages being put out by businesses:

> Yeah, and in shops you get sort of get the feeling they kind of stimulate bringing your own bags and not using unnecessary plastic bags. Usually they ask you in shops whether you want a plastic bag or not.

Where householders did not use their own bags and did accept plastic bags, virtually all reported that the bags were recycled or reused. The usefulness of the plastic bags could not be underestimated and many householders commented that it saved them the cost of having to purchase plastic bags, particularly for disposing of household rubbish:

> I think the plastics bags that we reuse are very useful so if you didn't have the plastic bags then you would probably buy more of them anyway. You'd buy other plastic bags to use around the house.

Where they were not reused, recycling of the bags was facilitated by the availability of plastic bag recycling bins at some supermarkets or locations.

Availability and choice of a range of products

The availability and prominence of products was a factor householders believed would facilitate actions to choose products with less packaging or with recyclable or reusable packaging.

> … you would look at the packaging and go, this is obviously going to be recyclable, it's not going to go into the general waste bin.

Information and labelling

For some householders, the actions of choosing products with less packaging or reusable or recyclable packaging could be enhanced through better information and labelling, as well as by the way products are arranged in supermarkets.

Awareness and lifestyle

Awareness of the impact of the action on the environment also influenced people's behaviour, particularly the detrimental effects of plastic bags on water life:

> I tend to choose products that have less packaging in – when I buy my fruits and vegetables and that, I don't normally bag them, 'cause I'm aware of the plastic bags with the sea – with animals and things like that. I used to be a bit of a conservationist. So I'm sort of aware with that.

For other households the everyday actions to reduce waste complemented the lifestyle of householders, again making these actions relatively easy things to do, although for some this was dictated by their income:

> We also look at what's going to go back into the environment. We may not think of it that way but we look and sort of say, well we'd prefer to buy this without all the chemicals and that involved. I don't know if our lifestyle is … our eating lifestyle influences us. We're vegan vegetarian….So it goes really strongly with our lifestyle that we do these things.

Education

Children were also facilitating householders' waste reduction behaviours by bringing home information and knowledge about environmental issues:

> The children are coming home from school and telling me about it as well. So they're quite aware of it.

5.2.7 Barriers to waste minimisation behaviours

In the same way that the advantages and disadvantages reflected different actions, the barriers and facilitators were also action-specific. Barriers around habits were predominantly associated with using one's own bags, while barriers to other everyday actions such as buying in bulk, buying concentrated products, and choosing products with less, or with recyclable/reusable packaging, were associated with cost, choice and availability, awareness and household size and storage space.

Habit

While the majority of householders had their own bags, the main barrier to their use was forgetting to put them in the car at home or to take them out of the car at the shopping centre. Other times householders would not have any bags in the car or have forgotten to take them when they stop to shop, or decide to go shopping on the 'spur of the moment'.

While this was a commonly reported barrier to using one's own bags, for some there was a sense and some recognition that the action was in the process of becoming habitual or more cognizant, while others simply acknowledged how 'useless' the bags were in the car:

> But it's not like we have got this constant habit of remembering. We're making the effort but it's not yet habitual.

One householder acknowledged that there would be some inconvenience associated with giving up plastic bags, but it was also something they could come to live with.

Limited by how the producers package

The everyday actions of choosing products with less packaging and choosing products with recyclable/reusable packaging was reported by householders as a factor very much influenced by how products were packaged by the manufacturers. Householders found excess packaging 'annoying', 'fruitless', and it was 'damn near impossible' to find products without too much packaging, and with little choice other than plastic packaging or excess packaging of some kind:

> I think a lot, most of it is outside our control, like less packaging. Because mostly it all does still come with a lot of packaging.

There was reduced choice for selecting products with no or less packaging or recyclable or/reusable packaging within the available products when going shopping.

Cost, quality and choice priorities

Not only were householders restricted by the type of packaging, often householders preferred a particular product, a product they 'know' or 'want' and this took priority over the packaging.

Householders also prioritised cost over buying in bulk or buying concentrated products. Similarly, cost was often prioritised over waste minimisation practices such as taking into account the type of packaging, bulk buying and buying concentrated products.

For others, consideration was given to the environmental impact of a product when many, rather than one big item are bought, or if the cost margin between the two was not too different.

> I do suppose if we would have a choice between an environmentally more correct option and the prices are kind of the same then we would pick the better one.

Lack of awareness

Some householders reported that they did not consciously participate in the everyday actions to reduce waste, particularly in relation to choosing products with less and reusable packaging, using disposable products and buying fewer goods that they don't need. Householders saw themselves as not 'proactive enough' and still of the 'old school', while still others, despite their lack of a 'conscious effort', were envisaging greater awareness in the future.

> I just don't think that I'm proactive enough. I'm still a bit of the old school and it's my son actually that's teaching me from school what we should be doing.

Actions of others

Other barriers to engaging in everyday actions to reduce waste included the actions of others, both other householders and in the case of avoiding disposable products, visitors.

Household size and storage

Further barriers to buying in bulk were household size and lack of storage space. Smaller households of one or two people, or those in smaller properties such as public housing units, preferred to buy smaller quantities that better met their needs and because they did not have the space to be able to store bulk items.

Scepticism

Some householders were sceptical about the rationale behind some waste practices, arguing that shopping bags are biodegradable and that the green *eco bags* will never break down:

> …So I think it's a bit of misrepresentation saying yeah, use these bags instead of carrier bags when they'll eventually end up in landfill and they'll stay there. Whereas a carrier bag will rot.

5.2.8 Summary of facilitators and barriers to waste minimisation actions

The interviews suggest that increased confidence in householders' abilities to minimise waste may be facilitated through developing the habit of engaging in the practices (e.g. using green bags when shopping), motivating the development of such habits through incentives, ensuring the choice and prominence of sustainable products, and generally raising awareness through information and labelling and education about the links between waste actions and outcome. In contrast, the lack of *good* habits (such as remembering to take green bags to the supermarket), the difficulty of finding products without excess packaging, cost considerations and preferences for known products, a lack of awareness on the part of householders and visitors, household size and storage limitations and scepticism, could act as factors that undermine confidence to engage in waste minimisation actions.

5.2.9 Developing supportive social norms

Perceiving normative support for waste minimisation was a key predictor of householders' waste minimisation intentions. From a TPB perspective, our perceptions of normative support are underpinned by an assessment of how much salient others approve or disapprove of the behaviour. Participants viewed themselves and their friends along a continuum of participation in and awareness of pro-environmental behaviour and in one sense their responses to the question of who, if anyone, would approve or disapprove of their waste reduction actions, depended on where they and their friends sat on this continuum:

> Interviewee 1: I guess we've got a wide circle of acquaintances and friendships, so some are extreme in their attitude to towards environment – save the whale, save the animals, do all that.
>
> Interviewee 2: But they're very few.
>
> Interviewee 1: And then we've got others on the other side that have no care whatsoever about this at all. I guess if you want to pinpoint us – we would be in the middle. We're stewards of what we've been given, but we're not going to elevate one thing over another.
>
> I tend to be a part of a number of vegan groups online and in Brisbane, and I guess they'd probably approve because a lot of people are fairly green on those but other than that ....
>
> There's quite a few girls, three straight away, in my immediate work environment who are save the orang-utans, save the everything. So they're very proactive in this type of stuff around recycling and energy and the environment.

In the main, householders believed that most individuals and groups approved of their everyday actions to reduce waste, including friends, children, family and neighbours, as well as vegan groups and their local council.

Some householders reported that they paid little attention to what others thought about their participating in actions to reduce waste, commenting that "as an individual I just do what's right for me", while others related their negative experience around the use of plastic bags:

> I went into Coles. There was a couple before me. They came in with their shopping material bags. They'd obviously brought it in with them. I didn't

have mine. They said well excuse me, you can buy those bags if you don't have them with you. I said, yeah, I know. It's only $2. I said, yeah, I know. Well you know, it makes you kind of feel like…you feel like you almost you have to do it, just because everybody else wants you to.

Individuals or groups reported as disapproving of householder's participation in waste reduction actions were very few and included partners of householders. Householders described how they may be perceived by friends, colleagues and family, not so much with disapproval, but as *mad* or as *hippies* for engaging in waste reduction behaviours. The only group mentioned who may disapprove were the plastic bag manufacturers. Still other householders reported that the topic had not come up for discussion or where it had, it was not so much disapproval as differences or disagreements in the way waste reduction actions were done.

5.3   Predicting past waste minimisation actions

Analyses were conducted to investigate the key predictors of the waste minimisation index. Among Brisbane respondents the variables accounted for 40 per cent of the variance of waste minimisation behaviours. As Table 32 shows the significant predictors were age, household composition, attitudes, descriptive norms, perceptions of control and household culture. Households who had engaged in more waste minimisation practices in the past:

→   Were older.

→   Were single-person households.

→   Had more positive attitudes to waste minimisation practices.

→   Had stronger perceptions that others in the community engage in waste minimisation.

→   Had a greater sense of control over engaging in the actions.

→   Perceived that they were part of a household with a stronger culture of environmental sustainability.

Among Melbourne respondents the variables accounted for 35 per cent of the variance in past waste minimisation behaviours. The significant predictors were gender, attitudes, descriptive norms and household culture. As Table 56 shows, Melbourne householders who had engaged in more waste minimisation actions in the past:

→   Were female.

→   Had more positive attitudes to waste minimisation.

→   Had stronger perceptions that others in the community engage in waste minimisation.

→   Perceived that they were part of a household with stronger culture of environmental sustainability.

Table 32: Significant predictors of waste minimisation for Brisbane and Melbourne respondents

Variables	Brisbane	Melbourne
Demographics	β	β
Gender	0.01	0.07*

Age	0.11**	0.05
Household tenure	0.05	0.06
Household income	-0.03	0.03
Level of education	0.02	0.01
Dwelling type	0.03	-0.02
Number in house	0.01	0.04
Household composition	-0.08*	0.02
Number of bedrooms	-0.04	-0.04
Size of garden	0.00	0.04
TPB variables		
Attitudes	0.17***	0.14**
Subjective norms	0.08	0.07
Descriptive norms	0.08*	0.13***
Self-efficacy	0.03	0.04
Perceptions of control	-0.08*	0.01
Household level variables		
Household culture	0.41***	0.37***

*$P < 0.05$, ** $P < 0.01$, ***$P < 0.001$. Note. Betas represent final betas once all variables are entered into the model.

5.4   Changes in household waste minimisation practices

The percentage of households who reported that the amount of non-recyclable waste they produced had decreased, increased or stayed the same is shown in Figure 18. It is clear that the majority of households in Brisbane (58%) and Melbourne (50%) reported that their waste production had stayed the same or increased.

Figure 18: Percentage of responses to the question of whether the amount of non-recyclable waste produced had changed during the past three years
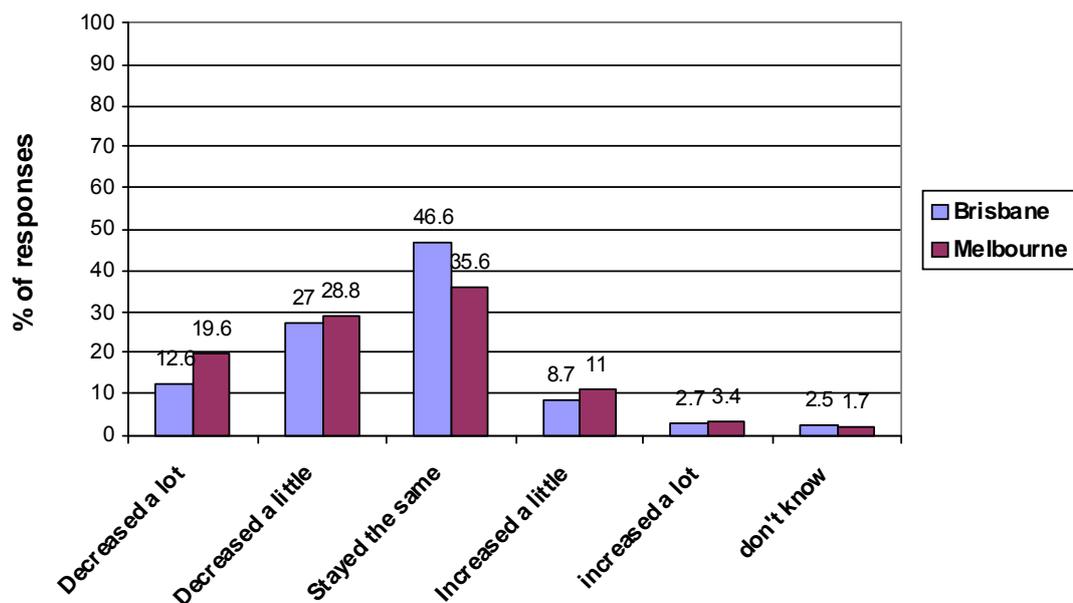
Among interview participants, responses to the question about changes in their everyday actions to reduce waste focused on the action of using one's own bags. This had been a major change for many households over the past three years.

For some householders some of the behaviours were things that they had always done, so there had been very little change; for others there was some change such as more consciously checking the recycling labelling or purchasing more products loose, while for others the actions listed were not conscious behaviours as the product and price dictated purchasing habits rather than waste-related concerns.

Other actions householders had started doing over the past three years were saying 'no' to unnecessary bags and avoiding disposable products.

Actions householders referred to that had changed or increased, other than those on the list, were recycling behaviour and composting.

> Trying to recycle more things and compost more items…not a lot of change in terms of how much waste we have. I think it's maybe still the same. It's just splitting it up and going to where I can; if it goes in the recycle bin or the compost or whatever.

Others spoke about an increase in their awareness, for example, in choosing recyclable or reusable products.

> Whereas a few years ago, I'd buy a plastic bottle of fruit that I could just – like you can get, I think, Goulburn Valley and ones like that. They're in a container, with a lid. You can just…put the whole thing in the fridge, cool it down, take your fruit out…so I'm more aware now of buying tins of fruit that I can put in a bowl or in a plastic container. But it's my plastic container that I'm not buying and then using and throwing it out and buying another one and using ….

Comparison of owners' and renters' reported changes in waste production

Among the Melbourne respondents there was a significant difference between owners and renters on waste produce. Owners reported decreasing the amount of waste they produced more than renters (owners mean = 2.44, renters mean = 2.82).

Comparison of household composition groups' reported changes in waste production

In Brisbane, differences across household composition groups emerged on the amount of waste produced. Respondents in single and multiple-adult households reported decreasing their waste more than family households (single person mean = 2.36, multiple adult mean = 2.53, family mean = 2.83). A similar pattern emerged for Melbourne respondents, although the differences were not significant (single person mean = 2.35, multiple adult mean = 2.45, family mean = 2.60).

Comparison of household income groups' reported changes in waste production

Differences across household income groups also emerged among Brisbane respondents for the amount of waste produced. Low-income households reported reducing the amount of waste produced the most (mean = 2.42), followed by medium-income households (mean = 2.65) and then high-income households (mean = 2.79). Significant differences for household income groups did not emerge for Melbourne respondents.

5.4.1 Reasons for decreased waste produced

Reasons for decreased and increased waste are shown in Table 33. The main reasons that respondents cited for decreasing the amount of non-recyclable waste that they produce were:

→ Awareness of ways to cut down waste.

→ Commitment of the household to protecting the environment.

Other highly cited reasons were:

→ The amount of goods that the household buys.

→ The amount of packaging that comes with products.

There was some overlap between the reasons provided by survey participants and the reasons provided by interview participants for changes in waste practices. Increased media coverage about environmental impacts was highlighted by interview participants as a reason for change. The increased exposure through media may in part account for the commitment to environmental protection cited by survey participants. Interviewees also highlighted changes in business practices (e.g. reduced availability of plastic bags, reduced packaging, increased recyclable and reusable packaging and increasing production of products in concentrate) as a reason for change. Again, the change in business practice may have helped to raise awareness of ways to cut down waste. In addition, interviewees cited societal pressure and increased convenience as reasons for change. Examples quoted below illustrate these points:

> it's only the last three years with all the talk of conserving everything that I've started to actively try to use them [the bags].

> I think it's a government push and a wise one of course. There's a limit to how far you can go with waste in the ground that's just not going to decompose.

> You don't want to be behind like other people are doing it, you know. It's become more and more popular that people say no to the plastic bags, so then you try to limit.

It is also worth noting that interviewees highlighted that lack of change was because it was out of the control of individuals and dependent on the actions of manufacturers (e.g. in terms of the amount of packaging they used).

5.4.2 Reasons for increased waste produced

For those Brisbane and Melbourne respondents who reported that they had increased the amount of non-recyclable waste that they generate, the most cited reasons for the increase were:

→ Changes in the number of people in the house.

→ The amount of packaging that comes with products.

→ The amount of goods that the household buys.

Other reasons cited by Brisbane respondents who increased their waste were lack of recycling facilities, and house renovations that produced waste. For Melbourne respondents *other reasons* included more take-away meals, moving to an apartment, not having a compost bin and extra charges for green waste bins.

Table 33: Percentage of respondents who cited a reason for changes in the amount of non-recyclable waste produced

Reasons	Brisbane		Melbourne	
	Reasons for decreased use %	Reasons for increased use %	Reasons for decreased use %	Reasons for increased use %
The state of the environment (e.g. climate change)	22.3	7.4	28.6	21.2
The commitment of you/your household to protecting the environment	63.4	25.0	71.8	25.9
The amount of packaging that comes with products	39.9	44.1	35.5	36.5
Government information promoting waste minimisation	9.7	5.9	9.1	17.6
Awareness of ways to cut down the amount of waste	71.4	23.5	72.5	24.7
Changes in the number of people in the house	22.3	60.3	18.5	54.1
The amount of goods that your household buys	42.4	44.1	34.5	29.4
Other	4.2	4.4	4.5	3.5

5.4.3 Reasons for consistent waste produced

For those respondents who indicated that the amount of non-recyclable waste they generated had not changed over the past three years, the main reasons provided for their waste generation were the amount of packaging that comes with products, awareness of ways to cut down the amount of waste, the amount of goods that the household buys, the number of people in the house and the commitment of the household to protecting the environment (see Table 34).

The *other reasons* that Brisbane respondents provided for their waste generation included: they were already recycling everything, that local government is not committed to recycling, supermarkets use unnecessary packaging and they are unable to buy unpackaged goods. Among Melbourne respondents, the other reasons provided included: don't care, conserving as much as possible, live in flat and therefore do not have control over rubbish, junk mail and minimising waste without compromising products purchased.

Table 34: Percentage of respondents (who reported no change in waste) who cited a reason for the amount of waste they produce

Reasons	Reasons given when reported water use did not change	
	Brisbane %	Melbourne %
The state of the environment (e.g. climate change)	14.3	20.4

The commitment of you/your household to protecting the environment	38.2	34.6
The amount of packaging that comes with products	57.5	51.7
Government information promoting waste minimisation	7.1	9.0
Awareness of ways to cut down the amount of waste	45.0	46.9
The number of people in the house	39.3	38.9
The amount of goods that your household buys	45.7	39.8
Other	2.5	3.3

6 HOUSEHOLD SUSTAINABILITY POLICY

6.1 Policy support

A key aim of the survey was to assess householders' support for a range of policies that can promote household sustainability. Inspection of Table 35 shows that there was support for most of the proposed strategies that could help households become more sustainable. The exceptions were taxes on unsustainable products; respondents in Brisbane and Melbourne were unsure about this policy. Respondents were opposed to strategies that involved increasing prices of energy, water or waste collection.

Table 35: Mean support for household sustainability strategies for Brisbane and Melbourne respondents

Strategy	Brisbane mean	Melbourne mean
Households changing everyday actions to be environmentally sustainable	4.32	4.32
Installing energy and water-efficient appliances in the home	4.53	4.50
In-home services that can advise your household on how to be environmentally sustainable	4.24	4.07
Labelling and information that provides information about the environmental sustainability of products	4.41	4.41
Government campaigns that promote household environmental sustainability	4.18	4.24
Government websites/information about environmental sustainability in the home	4.25	4.25
Taxes on products that are not environmentally sustainable	3.03	3.24
Increasing the price of energy, water and waste collection	1.96	2.29
Increasing the prices of energy, water and waste collection beyond an agreed limit of usage	2.63	2.81
Government rebates for environmentally sustainable appliances	4.30	4.34
Interest-free "green" loan schemes for purchasing and installing environmentally sustainable appliances	4.22	4.22
Laws that require that products and appliances are environmentally sustainable	3.86	3.97
Building codes that require homes to be environmentally sustainable	4.06	4.22

Note. Values ranged from 1 Strongly oppose to 5 Strongly support.

6.1.1 Qualitative responses to policies

The survey findings were mirrored by the results from the interviews. Interview participants were most supportive of households changing everyday actions, installing energy and water-efficient appliances, labelling and information, laws that require products and appliances to be environmentally sustainable, in-home services and building codes that require homes to be environmentally sustainable.

Changing everyday practices and labelling

Changing everyday actions was very acceptable to the majority of households who commented that it was something that was quite 'easy to do' and things that

you did not 'have to go out of your way' to do. The effectiveness of this strategy lies in households being consistent in their actions and in engaging all household members: "Yeah, well it is acceptable if everybody works together to do it". Householders supported labelling and information that provides information about the environmental sustainability of products as this increased householders' knowledge and awareness, it helped in householders' decision-making, and in making people 'informed' and more 'conscious'. Householders believed it was a 'good idea' and that they 'liked' labelling and supported more information coming into the home. However, while householders appreciated labelling information, it needed to be easy to understand and not voluminous, otherwise householders would not read the information.

> … just take out the tech talk that people don't understand and just bring it down to everyday language … they just want a bottom line statement, that helps.

It was also suggested that labelling information be included in advertising material:

> I noticed that some of the – when they advertise appliances in catalogues that often the energy rating is not advertised and that makes it very difficult … so not only should it be on the appliance, it should also be in the advertising for the appliance.

On the other hand some households reported being driven by the cost despite the labeling and one household was skeptical about the validity of the rating.

Laws requiring products and appliances to be sustainable

Householders accepted the strategy of laws that require products and appliances to be environmentally sustainable, commenting that enforced choice would help them to be more sustainable, despite acknowledging that, in all likelihood, there would be an increased cost.

> Well if the laws change, I'd have to change, that would force me. While I've got the option I'll still buy them.

It was also acceptable as a way to standardise company practices by having all companies on the same "level" and it would be a way to pull big companies 'into line'.

> It forces the big companies to make their products green so they get more competition, get better products, get greener products. So that's a good idea.

However, it was a strategy that would need to be implemented over the long-term so as not to 'shock' the consumer.

In-home advisory services

A number of households had taken up, or had planned in-home water or energy audits, while others did not have knowledge of the availability of services or as mentioned elsewhere in the report, a number of householders believed the service would be of less value to those who were 'knowledgeable' than to others who may have need of such a service.

In-home services were supported as a reasonable way to find out 'what's wrong with your house' as long as the cost of the service was reasonable and it was an objective 'no strings attached' service.

> … it's like that trust and a tradie coming in and telling me exactly what's wrong with your house, not pushing business, but saying, look, you need to seal these windows. You need all that done … Not coming in and go oh well this is the – just say, look, you know, if you want to support the environment, this will be the good.

Building codes that require homes to be environmentally sustainable

This strategy was well supported, particularly in relation to the construction of new homes as householders commented that it is much more viable to install energy and water-efficient appliances at the time of building than to retrofit these products to older buildings.

Some householders were concerned about the added costs of this type of policy, while others believed the costs could be *hidden* in the total building costs. There was some concern also about builders who are prone to taking 'short cuts'.

This strategy was something householders suggested to make 'routine', especially with the young so they 'will know that's how their life should be'. It was considered an effective strategy as long as it was 'compulsory' and 'enforced'.

Consistent with the survey results, interview participants found policies that were based on pricing mechanisms to be unacceptable.

Increasing the price of energy, water and waste collection

Most householders did not find increasing the price of energy, water and waste collection an acceptable strategy. Households thought increasing prices to be 'unfair', that they would be 'unhappy' if prices constantly increased, particularly when householders were already 'doing as much as [they] can'.

Households believed they were doing the best they could to save energy and water use and reduce their household waste, but felt that they were constantly being 'hit' with increased prices. Increasing prices in this context, when many households 'struggle' anyway, as well as in the context of houses potentially retrofitting their properties to make them more sustainable, was unacceptable.

Some households who believed that they could cover any increase, advocated on behalf of lower-income households and households with large families, and the potentially negative impact increasing prices would have on those types of households.

Only one householder believed the cost of power to be cheap, while a number of householders believed otherwise and thought that increasing prices would add an extra 'burden' on households and ultimately households will 'sacrifice' on other things to pay their bills rather than reduce their amount of energy use.

A number of householders had taken up the option to go onto 'green energy' noting that to do so they had chosen to pay more for their power.

Laws that limit household consumption of resources

Most householders did not support this strategy and many householders questioned how such a scheme could be implemented and enforced given differing household needs and size. It was believed that such a scheme would evoke resentment rather than change householder behavior and the strategy was seen to fly in the face of government obligation to provide utilities. Increasing householder understanding of household environmental practices so that they limited themselves was considered a better alternative. Where there was any

support from householders, it was a strategy that may be used as a last resort when and if resources were very low.

Taxes on products that are not environmentally sustainable

Householders also found taxing unsustainable products unacceptable. Similar to increasing prices, householders found this strategy particularly 'unfair' for people on low incomes where any added costs to the consumer are more likely to "deter" rather than motivate.

In relation to this strategy, householders believed government or business should be picking up the cost, not the consumer:

> Well I'd be more inclined to say that businesses should be taxed for that… hopefully it would make them think to start changing the way they manufacture stuff.

Although some householders thought this policy could be a good idea as it motivated specific product choices, there was acknowledgement that in other instances it penalises householders who want a particular product, even though it may not be a sustainable product.

Taxes were viewed by some householders as a way of 'grabbing money' and others wondered how such a scheme could be implemented—how will what's sustainable or not be decided or calculated. Others questioned whether such a policy would impact on development and industry negatively.

In terms of the effectiveness of this as a strategy, there was a perception that it would be better not to have the choice of non-environmentally sustainable products and that having fewer choices could be a more effective strategy.

Policies perceived to be most effective

Interview participants were also asked about the effectiveness of the various strategies. The strategies most commonly identified as effective included the installation of energy and water-efficient appliances, government rebates and government campaigns (identified by between ten and seven households). Other strategies less commonly identified included labelling and information, everyday actions, interest-free green loan, in-home services and building codes and laws requiring products to be sustainable (identified by between six and four households). Strategies only identified by one or two households included increasing the price, taxes on products that are not sustainable and websites and information. Only one household believed laws that limit household consumption of resources to be an effective strategy.

Installing water and energy-efficient appliances were perceived as most effective as it would 'mean people have to be less conscious of what they're doing'. Although there was a perception that households were installing more efficient appliances, it was stated that this strategy could be even more effective if the costs were kept down and governments assisted low-income families in public housing:

Rebates were seen to be effective as they offer the consumer 'incentive and encouragement'; they were seen as making a purchase 'viable' and a way of cutting householder costs. Householders also believed campaigns were effective and often expressed their preference for campaigns rather than legislation in motivating householders to implement changes. Householders often referred to effectiveness of the Target 155 or Target 170 depending on which state they lived in. Householders were also interested and 'happy' to receive feedback on their

water use through their water notices, commenting that this helped them become more 'conscious' by knowing how much water or energy they were using.

Campaigns were considered to be most effective using TV as the medium, showing more advertisements, more regularly and over a longer period of time to 'keep pushing' the message to the people.

Some householders believed government websites and information was an effective low-cost strategy, whereas others believed this strategy could be effective as long as the information provided was clear and non-biased and it provided some comparative information on products. Households reported using the web to seek information on environmental issues; some reported using them 'all the time' while others commented that websites might suit some householders more than others. Even when householders reported that they had not used government websites very much, websites were still acknowledged as an effective means for seeking information with some householders recalling particular sites:

> The Yarra Valley Water website, that was quite good to begin with. I remember at the time they'd offer monthly competitions and you could win showerheads and taps and trigger hoses… so that was quite an incentive and we used to do that quite a bit.

While websites were viewed as effective, some householders believed they were not as useful as campaigns. They 'would work for some people'. They were also viewed as having a limited audience as it was likely that those accessing websites were those already having a general level of awareness.

Householders suggested that access to government websites could be better promoted by using links on other sites and that there may be a need for different forms of media for different population groups, for example, brochures for older people and TV for the younger demographic who would respond better to 'visuals'.

Policies perceived to be least effective

Householders thought increasing prices (or taxes) would not impact household behavior, believing that this strategy would be:

> … a bit similar to increasing prices for cigarettes and alcohol. The people that don't pay attention to limiting their usage probably won't pay much attention to increased taxes and increased prices either. We just go we're trying to be as nice as possible already and we're getting penalised anyway.

While some householders believed that increasing prices had to happen and others believed that it may be necessary to increase prices, it was thought that householders should be 'encouraged' to use less rather than increase prices, particularly when householders were doing 'as much as they can' and had to manage on a low income. Others believed there should be some form of incentive or 'reward' for those whose consumption was low and steady for this strategy to be effective.

It was evident that green loan schemes were supported as a strategy that was a 'great idea', a 'good incentive' and would help 'motivate' households, however, no households had used the scheme and a number were even unaware of the scheme. The green loan scheme was considered limited in its effectiveness

because of the high cost of appliances anyway and it still required householders to have the financial capacity to pay off the loan.

A number of householders commented that they thought rebates were a better option to loans, which may just add to household "debt burden". It was nonetheless an option that householders would consider using in future purchases. Overall this strategy would need to be better promoted to be most effective.

6.1.2 Demographic comparisons of support for policies

The analyses assessing renters and owners showed that among Brisbane respondents, there were significant differences between owners and renters in their acceptance of:

→ Households changing their everyday actions.

→ Households installing energy and water-efficient appliances.

→ Increasing the price of energy, water and waste collection beyond an agreed usage limit.

As the means in Table 36 show, owners were more supportive of the non-economic policies, whereas renters were more supportive of the economic-related policies.

Among Melbourne respondents, the only significant difference to emerge between owners and renters was for:

→ Households changing their everyday actions.

Owners were more supportive of this policy than renters.

Table 36: Mean support for policies for renters and owners in Brisbane and Melbourne

	Brisbane		Melbourne	
	Owners mean	Renters mean	Owners mean	Renters mean
Changing everyday behaviour	4.38	4.22	4.38	4.17
Installing energy and water-efficient appliances	4.60	4.40	4.53	4.40
In home services that provide advice	4.27	4.17	4.11	3.97
Labelling and information on products	4.45	4.33	4.45	4.31
Government campaigns	4.19	4.16	4.28	4.16
Government websites/information	4.29	4.19	4.26	4.22
Taxes on unsustainable products	2.97	3.16	3.23	3.27
Increasing price of energy , water, and waste	1.88	2.12	2.25	2.38
Increasing price of energy, water and waste collection beyond an agreed threshold	2.53	2.84	2.81	2.82
Govt rebates for sustainable appliances	4.31	4.33	4.36	4.29
Interest-free 'green' loans	4.19	4.26	4.22	4.24
Laws that require that products to be sustainable	3.87	3.83	3.99	3.91
Building codes that require homes to be sustainable	4.04	4.11	4.26	4.11

There were no significant differences between household composition groups or household income groups in terms of their support for the policies.

6.2 Perceived fairness of policies

Strategies that encouraged household sustainability through voluntary change, information, incentives and services, were perceived to be fair to the average Australian family. Strategies that involved taxes and increased pricing of energy, water and waste collection were perceived to be unfair. The mean response to laws that require products to be sustainable fell between neither fair or unfair and fair.

Table 37: Mean perceived fairness of household sustainability strategies for Brisbane and Melbourne respondents

Strategy	Brisbane M	Melbourne M
Households changing everyday actions to be environmentally sustainable	4.13	4.16
Installing energy and water-efficient appliances in the home	4.15	4.14
In home services that can advise your household on how to be environmentally sustainable	4.14	4.04
Labelling and information that provides information about the environmental sustainability of products	4.30	4.29
Government campaigns that promote household environmental sustainability	4.13	4.19
Government websites/information about environmental sustainability in the home	4.20	4.19
Taxes on products that are not environmentally sustainable	2.67	2.90
Increasing the price of energy, water and waste collection	1.90	2.20
Increasing the prices of energy, water, and waste collection beyond an agreed limit of usage	2.49	2.73
Government rebates for environmentally sustainable appliances	4.20	4.26
Interest-free 'green' loan schemes for purchasing and installing environmentally sustainable appliances	4.16	4.21
Laws that require that products and appliances are environmentally sustainable	3.80	3.89
Building codes that require homes to be environmentally sustainable	3.94	4.08

Note: Values ranged from 1 Very unfair to 5 Very fair.

6.2.1 Demographic comparisons of perceived fairness of policies

Comparisons of owners' and renters' perceptions of fairness showed that among Brisbane respondents, owners and renters differed in the perceived fairness of:

→ Households changing their everyday behaviours.

→ Taxes on products that are not environmentally sustainable.

→ Increasing the price of energy, water and waste collection.

→ Increasing the price of energy, water and waste collection beyond an agreed limit of usage.

Owners perceived that the policy of households changing their behaviour to be more fair than renters, whereas renters perceived taxes and increasing prices to be fairer than owners.

There were no significant differences between Melbourne owners and renters on their perceptions of policy fairness.

Table 38: Mean fairness perceptions of owners and renters in Brisbane and Melbourne

	Brisbane		Melbourne	
	Owners *mean*	*Renters* *mean*	*Owners* *mean*	*Renters* *mean*
Changing everyday behaviour	4.19	4.01	4.18	4.09
Installing energy and water-efficient appliances	4.18	4.09	4.14	4.15
In home services that provide advice	4.18	4.05	4.09	3.89
Labelling and information on products	4.33	4.25	4.31	4.24
Government campaigns	4.19	4.16	4.28	4.16
Government websites/information	4.15	4.11	4.21	4.14
Taxes on unsustainable products	2.54	2.94	2.90	2.90
Increasing price of energy, water and waste collection	1.81	2.09	2.16	2.30
Increasing price of energy, water and waste collection above an agreed limit of usage	2.39	2.70	2.76	2.66
Government rebates for sustainable appliances	4.21	4.17	4.29	4.20
Interest-free 'green' loans	4.14	4.19	4.23	4.16
Laws that require products to be sustainable	3.80	3.80	3.90	3.87
Building codes that require homes to be sustainable	3.90	4.00	4.12	4.00

There were no significant differences in the perceived fairness of the policies depending on the respondents' household composition or income level.

6.2.2 Qualitative responses to policy fairness

Householders held two dominant positions on the question of whether there should be different policies for different people. The discussion often turned to income and costs and in this case opinion was split between needing to consider different groups such as larger families, older people, people with medical conditions and those who wanted an equitable system, in terms of water and energy use, across all income and household types and needs.

Some believed there needed to be exceptions but overall there should be equity across all groups in terms of water and energy use. Exceptions were needed for people who had medical conditions that required access to power or water beyond average household use, such as those with emphysema or those using dialysis machines.

Some believed in a different policy framework for some lower-income groups and not for others, for example the unemployed. Others agreed that there should be different policies for different groups, including those who go above and beyond average use and *waste* resources. One lower-income household believed there needed to be some pricing arrangement for larger houses that used significant energy or water resources.

Often the difficulty in increasing one's household sustainability was the initial up-front costs of energy and water-efficient appliances and systems, particularly for low-income households, so policy to support this was warranted.

Single elderly pensioners acknowledged the subsidy they currently receive and believed they would struggle even more than they do without this subsidy. Interestingly some pensioners would initially disagree with the idea of different policies for different groups until reminded of their current energy subsidy. Some commented that it was difficult to gauge where one could "draw the line" in terms of offering different policies to different groups.

High-income earners were not averse to subsidies for low-income earners; however, they would not be happy to incur higher prices and be 'penalised':

> We're doing our best to be as nice as possible in our footprint and then still get slapped with higher prices, I wouldn't really like that. But I'm all for giving rebates to the people that need it.

Householders suggested a bonus or some form of incentive be offered to people as a means of reducing household water and energy use and increasing recycling behaviour. Others believed that a split costing system might encourage higher users to reduce their use.

There was also support for current policy that catered for older people in terms of watering times: older people are allocated a later time in the morning to water considering their capability.

6.3 Policy fairness to vulnerable groups

Respondents were asked to nominate any strategies that they thought were unfair to vulnerable groups in Australia, such as the elderly and low-income families. Figure 19 shows the percentage of respondents who nominated each strategy. A majority of respondents nominated the strategies that involved taxes and increased pricing as unfair and Brisbane respondents cited these strategies more than Melbourne respondents. Approximately 30 per cent of Brisbane respondents also nominated installing energy and water-efficient appliances (Melbourne respondents responded similarly), laws requiring that products and appliances are sustainable and building codes that require homes to be sustainable as unfair.

Figure 19: Percentage of respondents who nominated the strategy as unfair to vulnerable groups in Australia
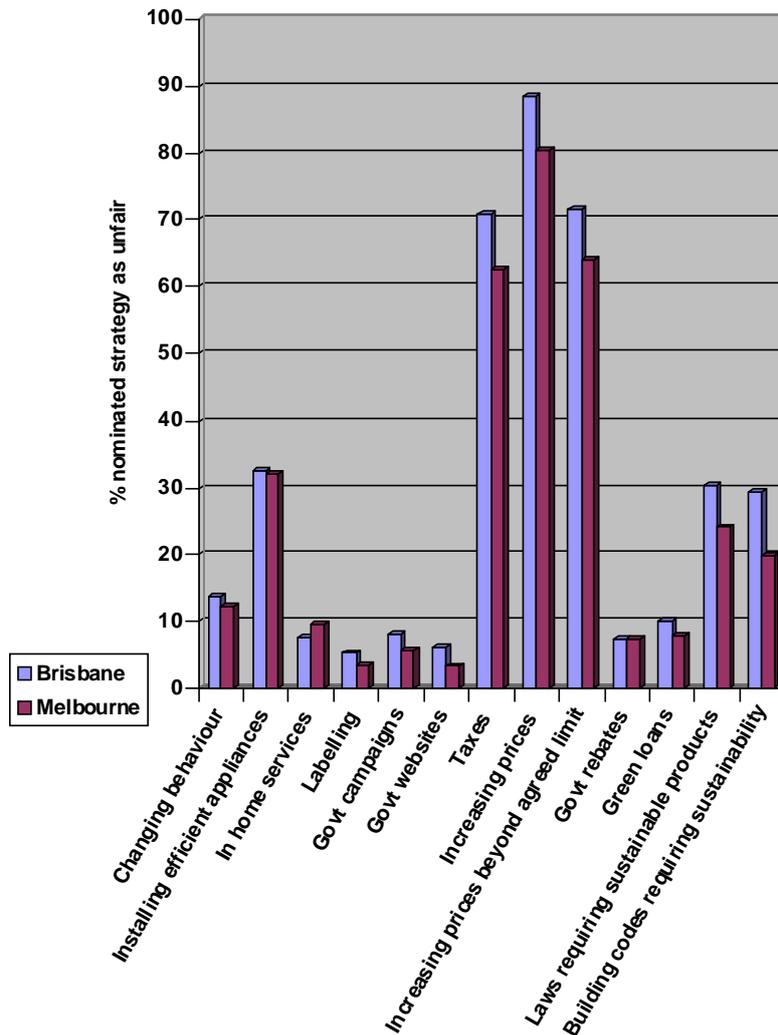
6.3.1 Demographic comparisons of perceived fairness of policies to vulnerable groups

Comparisons across tenure groups showed that the percentage of respondents who indicated that a policy was unfair did not significantly differ for Brisbane owners and renters. Among Melbourne respondents, significant differences emerged between owners and renters on:

→ Increasing the price of energy, water and waste collection.

→ Increasing the price of energy, water and waste collection beyond an agreed limit of usage.

Owners nominated increasing the price of energy, water and waste collection (owners: 83.6%, renters: 71.7%) and increasing the price of energy, water and waste collection beyond an agreed limit of usage (owners: 67.2%, renters: 55.4%) as unfair more often than renters.

There were no significant effects of household composition for Brisbane or Melbourne respondents on whether respondents nominated a policy as unfair to vulnerable groups. Comparisons across household income groups showed that the only difference to emerge was among Brisbane respondents on:

→ Increasing the price of energy, water and waste beyond an agreed limit.

Respondents from low-income households cited this policy as unfair more often than medium, or high household income respondents (low income: 78.5%, medium income: 66.5%, high income: 63.9%).

7 SUMMARY AND CONCLUSIONS

7.1   What are Australian householders' waste/water/energy attitudes and practices?

Householders in the study had very positive attitudes to water and energy conservation and waste minimisation practices. The interviews highlight that beliefs about the economic and environmental benefits of these practices may underpin the positive attitudes. In contrast, less positive attitudes may be underpinned by beliefs about the inconvenience of conservation and waste minimisation actions and the costs and ineffectiveness of efficient and sustainable appliances and products. Respondents perceived relatively high levels of support from important other people in their lives to engage in these types of practices. They also had a sense that others in the community were also engaging in practices to conserve energy and water—especially water conservation—and to minimise waste. The perception of support from family and friends and the community in general for sustainability actions was something that came through clearly in both the survey and interview results with respondents perceiving water conservation as something that all Australian are concerned about.

To engage in these practices, people need to feel a sense of self-efficacy (i.e. confidence in one's own abilities to carry out an action) and control. Responses to questions tapping these dimensions suggest that, on average, respondents had high levels of confidence in their ability to engage in the practices, although confidence was greater for everyday behaviours to conserve energy and water than installing energy and water-efficient appliances. Perceptions that these practices were within respondents' control were also fairly high, with some evidence of greater control over engaging in everyday energy conservation practices than installing energy-efficient appliances. The focus of interview respondents on the financial costs of efficiency measures highlights one of the potential reasons for the difference in self-efficacy and control across efficiency and curtailment actions. The interviews also suggest that the type of factors that can help households more easily engage in sustainable practices include providing information through education (e.g. in schools), feedback or labelling of products and appliances, and making products and appliances more affordable (e.g. through rebates). On the other hand, the lack of 'good' habits and the unsustainable actions of others were often cited as factors that could make it harder to engage in everyday actions to conserve water and energy and reduce waste.

We also gauged respondents' commitment to these practices by asking about their intentions to engage in waste, water and energy practices in the future. Intentions were high, although again, there was some evidence of greater commitment to everyday water and energy conservation practices than practices that relate to installing water and energy-efficient devices.

Respondents reported that they always engage in many of the everyday practices aimed at conserving water around the house and garden. Again, these results are supported by the interviews with many householders pointing out that these actions have become a habit. In terms of practices that promote ongoing water efficiency, a majority of respondents reported that they had installed low-flow taps and showerheads, hoses with a trigger or a timed water system, water-efficient washing machines, dual-flush toilets, and in Melbourne, shower timers. The finding that a majority of respondents engage in water-saving practices accords

with Australian Bureau of Statistics (ABS) data on water conservation in Australian households (ABS 2007). It is interesting to note that where respondents had not already installed the water-efficient appliances, on average they did not have a strong commitment to install them in the near future. Factors such as the cost of retrofitting appliances, the perceived lack of need for the appliance, and the difficulty of renters installing the appliances, were often mentioned as barriers to installing water-efficient appliances.

These findings are not surprising in light of the recent drought conditions experienced by residents of both Brisbane and Melbourne. Householders in these cities have been exposed to high-level water restrictions, water conservation campaigns that encompass information and rebates for water-efficient appliances, and persuasion campaigns aimed at reducing household water use. Moreover, the finding that the majority of householders reported decreasing their water use over the past three years is corroborated by the reductions in average per person water use in both cities in response to goal-setting campaigns (e.g. Target 140, Target 155). Further evidence of the link between decreased water use and government regulation and campaigns comes from the reasons that householders provided for their decreased water use; many householders cited the state of the environment and government regulation as key reasons for decreased water use, as well as awareness of ways to save water.

Our results also show that respondents report that many everyday actions to conserve energy are established practice. Switching off appliances at the power point and switching off computers and electronic appliances when not in use were less established practices. Again, this finding is confirmed by the interview results with interviewees emphasising the inconvenience of these latter actions. The finding that switching off appliances at power points and switching off computers and electronic equipment when not in use are not yet well established practices, is concerning when considering that energy use from household appliances, including standby power, has increased significantly from 1989–90 to 2006–07 (Sandu & Petchey 2009).

In contrast to our findings, Randolph and Troy (2007) found that energy-saving practices were not widespread among their Sydney sample. However, they note that a majority of householders had intentions to take action to reduce energy in the future, a finding that perhaps reflects the growing importance of energy conservation. In terms of installing appliances to ensure energy efficiency around the home, a majority of respondents had installed compact fluorescent lighting, energy-efficient electronic equipment, and energy-efficient white goods. Similar to national statistics (ABS 2005), only a small minority (between 5% and 12%) had installed solar hot water or solar panels. Among those respondents who had not already installed energy-efficient appliances, there were only moderate intentions to install energy-efficient electronics and white goods, household insulation and compact fluorescent lighting in the near future. On average, respondents did not intend to install solar hot water or solar panels in the near future despite the government rebates in place to help with installation of solar and other efficient appliances. Interview respondents highlighted the high costs of efficient appliances, especially solar hot water and solar panels, and the perceived ineffectiveness of the appliances as significant barriers to their installation.

The survey results suggest less focus on waste minimisation from householders compared to energy and water conservation. Reusing plastic bags was the only established practice among respondents. Interviewees cited the lack of habit related to certain waste minimisation actions (e.g. using your own bags when

shopping) and the inevitable packaging provided by manufacturers as factors that act as a barrier to waste minimisation actions. It was also clear that, for some, the desire to purchase a preferred product over-rode waste minimisation considerations.

7.2 Are there differences in these attitudes and practices across socio-economic groups?

Responses to the survey questions were compared for respondents who differed in their tenure (owners vs. renters), household composition (single person vs. multiple adult vs. family households), and household income (low, medium, high-income households). The clearest differences emerged for tenure, with owners reporting more positive attitudes and greater engagement in household sustainability practices. However, it must be noted that the pattern was not consistent across all practices and in some cases there were differences between Brisbane and Melbourne owners and renters. However, in general, owners had stronger intentions to engage in water conservation in the future, they reported currently engaging in more of the everyday water-conserving practices, and having more water-efficient appliances installed in their homes than renters. There were less marked differences in energy conservation: owners had more positive attitudes and stronger intentions to engage in energy conservation than renters. There was also some evidence that owners had installed more energy-efficient appliances (i.e. compact fluorescent lighting, insulation, energy-efficient white goods), and that they had stronger intentions to install energy-efficient appliances in the near future (i.e. solar panels, insulation). The differences that emerged between owners and renters may reflect the real barriers that exist for renters: it may be more difficult for them to conserve resources because landlords do not always install efficient devices and they are not in a position to install them because it is not their property. This conclusion is certainly supported by the results of the interviews. It is also the case that renters may not receive water bills or their water use may not be individually metered, resulting in less awareness and less incentive to conserve water (Randolph & Troy 2008).

Some differences in attitudes and practices emerged across respondents from different household compositions, although the differences were not as clear cut as for renters and owners and they emerged more strongly for Brisbane than Melbourne respondents. For water conservation practices, there was evidence that single-person households engaged in more everyday water conservation practices than multiple-adult or family households but that family and multiple-adult households had installed more water-efficient appliances (i.e. water tanks in Brisbane, water-efficient dishwashers in Melbourne). There was also evidence that: (1) single-person households (and to a lesser extent multiple-adult households) engaged in more everyday energy conservation practices than family households; (2) multiple-adult households in Melbourne were more energy efficient in terms of electronic equipment than family households; and (3) multiple-adult households in Brisbane had more positive attitudes to energy conservation than family households. Family households also felt they had less control over whether they could minimise waste and whether they used their own bags when they went shopping. The general pattern seems to be that single-person households conserve through behavioural change—no doubt because it is easier to change the behaviour of one person than many, whereas family or multiple households conserve through efficiency devices. Further corroboration of this finding comes from the interview results; interviewees cited the behaviour of

others, and this often included other household members, as a barrier to everyday sustainability practices.

Few differences emerged across the household income groups on waste, water and energy attitudes and practices, and again, the differences that emerged were stronger for Brisbane than Melbourne respondents. Where differences emerged, the pattern was for low-income households to have more positive attitudes and engage in more of the practices than high-income households. Specifically, respondents in low-income households had more positive attitudes to water conservation and stronger intentions to engage in sustainable water (and to a lesser extent waste and energy) practices. Low-income households also reported engaging in more everyday energy and water conservation practices and waste reduction practices than high-income households. In contrast, more respondents in high-income households had installed energy-efficient dishwashers than medium or low-income households. However, to reiterate, these differences did not emerge strongly across all practices or across both cities. These findings, although weak, are not surprising in that behavioural strategies to conserve resources can result in cost savings without any financial outlay, a win–win solution for low-income households. However, the results of the interviews seem to suggest that economic concerns were primary for all householders, with one high-income family deciding not to install solar panels because they could not access rebate.

7.3 How have waste/water/energy attitudes and practices changed over time and what factors have driven changes?

A majority of householders indicated that their water use had decreased over the past three years, a finding that is corroborated by actual decreases in water use in Brisbane and Melbourne in recent years. Where respondents had indicated a reduction in their water use, the state of the environment (e.g. drought), government regulations (e.g. water restrictions), the commitment of the household to protecting the environment and awareness of ways to save water, were the most cited reasons for the reduction. As noted above, the reasons provided are not surprising given the environmental and policy context surrounding water in Brisbane and Melbourne leading up to the research. Residents have been exposed to policy and regulation that has specifically sought to reduce water use through restrictions, raising awareness of environmental conditions and the need to reduce water usage, and providing information and rebates to facilitate water conservation.

The majority of householders reported that their energy use had stayed the same or increased over the past three years, a finding that is broadly consistent with a recent ABARE research report showing that energy use in the Australian residential sector has increased by 34 per cent between 1989–90 and 2006–07 (Sandu & Petchey 2009). The finding is interesting though when considering the positive attitudes reported by householders to energy conservation and the relatively high levels of energy curtailment and efficiency actions reported by householders. One explanation for the discrepancy may be that government campaigns and regulation focused on energy conservation have raised awareness of energy conservation and have encouraged the installation of some energy-efficient appliances, while householders at the same time have increased their uptake of energy-using appliances (e.g. air-conditioning, electronic equipment; Sandu & Petchey 2009; ABS 2005). Consistent with this analysis, the

main reason provided for decreased energy use was awareness of ways to save energy around the house. Commitment to protecting the environment, changes to fittings and appliances around the home, and the cost of energy were also mentioned by more than 30 per cent of the respondents. This finding clearly highlights the importance of information that raises behavioural awareness about energy saving but also suggests a role for technical solutions, pricing mechanisms and environmental concern in encouraging household energy conservation.

In terms of waste, the most common response was that the amount of non-recyclable waste produced had stayed the same. Among those who reported decreasing their waste, awareness of ways to cut down waste, and commitment of the household to environmental protection were the predominant reasons cited for reducing the amount of non-recyclable waste the household produces. Results of the interviews suggest that awareness and environmental concern may have been promoted by increased media coverage of the environmental impacts of waste as well as social pressure. Current government policies in Queensland and Victoria that promote a zero waste approach and emphasise the principles of reducing, reusing and recycling may also have helped to raise awareness and environmental concern. The findings highlight the very real constraints that exist for people: houses with more people produce more waste and products often have a lot of packaging.

Although not a central question, we explored whether practice changes were influenced by tenure, household composition and household income. Where differences emerged (and they were not marked or consistent), the general pattern was for owners, single and multiple-adult households, and low-income households to report greater decreases in their water and energy use and waste than renters, family households or medium and high-income households.

7.4 What is the relationship between householders' waste/water/energy attitudes and practices (i.e. behaviour)

In the survey we measured behaviour in two ways:

1. Intentions to engage in waste, water and energy conservation practices (i.e. commitment to these practices).

2. Self-reported current energy, water and waste practices (as discussed previously, the quality of the objective measures of energy and water use were compromised and therefore not analysed).

The most important predictors of intentions to engage in water, energy and waste minimisation practices were: positive attitudes to these practices, a belief that other important people support the practices (i.e. normative support) and feeling confident that one can save water/energy/reduce waste through the practices. In some cases past behaviour was important. For example, respondents who had installed more water-efficient appliances outside their homes had stronger intentions to install water-efficient appliances in the future; respondents who reported switching off unused lights or unused appliances more frequently in the past had stronger intentions to engage in everyday energy-saving practices in the future. The latter finding suggests the importance of establishing 'good' habits. The effects of socio-demographic factors on intentions were sparse and weak.

Socio-demographic factors were more important in understanding the past water and energy conservation actions of householders, although their effects were not consistent across behaviours or cities. Age emerged as an important determinant of water conservation, energy conservation and waste minimisation, with more of these actions associated with older respondents. Tenure was also an important positive predictor of everyday water conservation actions and the extent to which water-efficient appliances had been installed. Positive attitudes and perceived normative support were also important determinants of everyday water and energy conservation, and waste minimisation practices as they were for intentions. It was also evident that when respondents were part of a household with a culture of environmental sustainability—that is, sustainability was important to the household and there was agreement among household members about taking action in relation to sustainability—they engaged in more everyday water and energy conservation and waste minimisation. This latter finding points to the importance of developing a culture of environmental sustainability in the home to support householders' sustainable actions.

7.5 What are the most effective ways of shaping positive change in household waste/water/energy perceptions and behaviour and what are the costs and benefits of these approaches for stakeholders?

There was clearly a preference for policies that promote voluntary change over those that enforce change through penalties and disincentives. Economic considerations (e.g. cost of energy) emerged as an important reason for respondents' energy use, and more broadly, cost considerations were important beliefs related to energy and water conservation and waste minimisation among interview participants. Not surprisingly then, policies that promote household sustainability through pricing mechanisms such as taxes or increasing the price of water, energy or waste collection were not supported and were thought to be unfair. Interview participants also indicated that these policies would not be effective and may result in resentment. Policies that address household sustainability through regulation such as building codes or preventing the sale of non-sustainable products are more supported than the purely economic policies.

Taken together, our research suggests that positive changes in household water and energy use and waste minimisation will be achieved through multiple pathways. Strategies that promote environmental concern and awareness, those that foster positive attitudes to sustainable practices and encourage the emergence of social norms that support sustainability practices, those that provide householders with knowledge and awareness of how to go about being sustainable, and those that overcome the very real economic constraints that households face in their efforts to become more sustainable, are likely to be the most successful. Participants in our research suggest that there is a role for regulation but it does not appear to be acceptable as a major driver for change.

7.6 Implications for household sustainability policy

Moving households toward sustainability is a process of social change and therefore one that is ongoing. Despite householders' preferences for voluntary change policies, the likelihood is that a mix of regulation, pricing and voluntary behaviour change may provide the most appropriate triggers and signals to achieve household sustainability. Interview participants acknowledged that people may need to be forced to change; hence, regulatory mechanisms have a role to

play in this regard. Nevertheless, our research clearly highlights that consideration must be given to how regulation and pricing mechanisms impact on vulnerable groups within society. Currently there is evidence of regulatory and pricing approaches to encourage household sustainability. For example, water restrictions are evident in both Brisbane and Melbourne. New residences built in south-east Queensland are required to replace 70 000 litres per year from rainwater or onsite recycling (e.g. greywater system) (Queensland Water Commission 2010a). Moreover, the price of water has recently risen in south-east Queensland and is flagged to increase further (Queensland Water Commission 2010b). Thus, it appears that policy approaches already reflect the mix of regulation, pricing and voluntary change. In the following section we highlight some of the implications of our research for policy development, recognising that in some cases these recommendations are already reflected in current policy approaches.

Developing behaviour change approaches

Steg and Vlek (2009) outline a framework for developing strategies to promote positive environmental behaviour change. After first choosing those actions that have the most impact on environmental quality as the targets for change, they argue that main factors that influence the actions should be identified (e.g. beliefs, attitudes, contextual factors, etc.). Once the underlying factors are identified, the next step is to design and apply interventions that address the underlying factors. The final step is to evaluate the effectiveness of the interventions. In the discussion below we highlight some of the factors that our research identified as underlying factors of household sustainability practices and suggest interventions that could help to address these factors.

Identifying beliefs

Beliefs about household sustainability practices, whether real or perceived, shape householders' psychological and behavioural responses. Therefore, consistent with Steg and Vlek (2008) we argue that it is critical that campaigns or policies that aim to change behaviour or encourage uptake of efficient appliances identify and address householders' beliefs. The results of the interviews identified important beliefs that are associated with water and energy conservation and waste minimisation. For example, householders are unlikely to develop the habit of turning off appliances at the power point if it is (or if they believe it is) difficult and inconvenient to do so. Strategies or technological solutions that make these actions easier could help address this belief/reality. Similarly, providing information that highlights cost savings and environmental benefits and addresses concerns about appliance effectiveness, may encourage uptake of energy or water-efficient appliances. For example, the Northern Territory Waterwise Central Australia Rebate Scheme provides information about the benefits of using water-efficient products (Northern Territory Government 2010). Information that highlights the advantages and addresses beliefs about the disadvantages of household sustainability actions can help develop more positive attitudes to sustainability practices.

Facilitators and barriers

Important beliefs to identify are the facilitators and barriers that make it easier or harder for households to engage in sustainable practices. For example, financial considerations emerged as important barriers to installation of energy and water-efficient appliances and purchase of sustainable products. The preponderance of rebate schemes at Commonwealth and state government levels suggests that this

barrier is well understood. Although householders cited rebates as a facilitator, there was also recognition that the difficulty that some people experience in accessing these schemes—either because of ineligibility or lapsed availability of the schemes—means that they do not always have the desired effect. Tenure was also identified as an important barrier to household sustainability. Public and private renters have less capacity to install efficient appliances, either because of the costs of the appliances or because the lack of ownership of the property makes it impractical. This finding suggests that policies that target landlords may have better results than those that are focused solely on renters. Providing product information through labelling schemes, as well as bottom-up and top-down education approaches were also identified by householders as facilitators of household environmental sustainability. Clearly, these are policy approaches that are already in place and thus, our research suggests the effectiveness of these approaches.

Establishing household sustainability norms

Our research suggests that social norms play a central role in facilitating household sustainability. Sustainability intentions and behaviours were related to perceptions of support from family and friends and the community. Being part of a household with a culture of environmental sustainability was also related to greater engagement in everyday water and energy-saving practices. In the literature a distinction is drawn between two types of norms: what people ought to do (i.e. injunctive norms) and what people actually do (i.e. descriptive norms). Injunctive norms reflect morally approved or disapproved conduct (Cialdini et al. 1990), whereas descriptive norms describe what is typical behaviour. According to Cialdini et al. (2009, p.1015) descriptive norms motivate behaviour by providing information about what behaviours are likely to be effective and adaptive: "If everyone is doing it, it must be a sensible thing to do." The gap between the overwhelmingly positive attitudes to household sustainability practices and householders' self-reported behaviour may reflect the distinction between these two types of norms. Our findings suggest that although there is widespread approval of household sustainability in the community, for some sustainability actions it is not yet what people typically do. This interpretation suggests that communicating descriptive norms to the community may help to encourage greater engagement in sustainability practices.

Recent research conducted in California showed that providing descriptive normative information about what others in the community are doing to conserve energy resulted in larger decreases in household energy consumption than simply providing information linking energy conservation to environmental, social or economic benefits (Nolan et al. 2008). The water conservation campaigns conducted in Brisbane and Melbourne that provided residents with per person water use targets (e.g. Target 140, Target 155) and media coverage of the extent to which the targets had been met by the community, is a powerful example of providing both goals and descriptive norm feedback. Consistent with the argument of Cialdini and colleagues (Cialdini et al. 1990), the campaigns provided people with information that 'everyone is doing it' (i.e. saving water). Where possible then, providing feedback to householders that others are engaging in household sustainability practices (e.g. conserving energy through installing solar energy), or having households publicly declare their conservation commitment ("We're an emerging saving household") may help to communicate these norms. Finding out that others in the community save energy or recycle or minimise their waste sends a message that these are sensible and effective things to do.

Targeting interventions to population groups

Finally, strategies to promote household sustainability must take into account the situation of the householder. As noted above, policies may need to target landlords as well as renters to have maximum effect. For example, landlords can charge renters in Brisbane for water consumption if the rental property is individually metered and the property is water-efficient. In South Australia, a program aimed at low-income households aimed to reduce financial hardship, reduce energy use and greenhouse gas emissions, and increase comfort through free energy audits, free retrofit kits, buyback of inefficient appliances and interest-free loans for efficient appliances (Spoehr et al. 2006). Our results suggest that low-income households may also respond well to programs focused on resource conservation through behaviour change.

7.7 Limitations of the research

The main limitation of the study was the use of self-report measures rather than objective measures of household sustainability practices. We did not aim to collect objective measures of waste due to the prohibitive cost of household bin audits; however, we attempted to collect household energy and water consumption through self-report of householders' utility bills. However, the quality of the data made it unusable with many values out of normal or expected ranges. In part this was due to an error in the online survey program. Differences in how gas is administered to households (e.g. centrally or through gas bottles) also created obstacles to accurate data collection. Gaining consent from householders to access their water and energy bills from utilities is one way to ensure the quality and objectivity of consumption data. This was not deemed suitable for an online panel survey as written consent forms are necessary and not easily obtained through the online format. In future online survey research, the problems experienced in this project may be overcome by providing screen captures of utility bills with explanation of where to find the necessary data and also allowing a 'don't know' option. Despite the issues raised by the self-report format in the current study, the consistency between self-reports and government findings for energy and water use in Australian households increases our confidence in the findings.

A further limitation of the research is the potential for sampling biases such that people with a greater interest in the topic are more likely to take part. We tried to reduce this bias by using an online survey panel who have signed up to take part in research, regardless of the topic. It must also be acknowledged that the predictive power of the survey variables was greater for intentions than for past behaviour, suggesting that there are other factors associated with sustainability behaviour that have not been captured in the current research. Finally, as noted previously, two versions of the survey were administered—one focusing on energy and water curtailment and the other on energy and water efficiency. Ideally all respondents would have answered questions about both types of conservation practices; however, the two-version strategy was adopted because of survey length constraints and concerns about respondent fatigue and data quality.

In summary, the current research has identified Australian householders' sustainability attitudes and practices and the way these have changed over time. The research also identified the household sustainability policies that are most supported by householders. Links between the findings from the current research

and existing policy approaches are drawn and suggestions are made for developing future strategies to promote greater household sustainability.

REFERENCES

Abrahamse, W., Steg, L., Vlek, C. and Rothengatter, T. (2005) A review of intervention studies aimed at household energy conservation. *Journal of Environmental Psychology*, 25(3), 273–291.

Aitken, C., Duncan, H., and McMahon, T. (1991) A cross-sectional regression analysis of residential water demand in Melbourne, Australia. *Applied Geography*, 11, 157–165.

Aitken, C., McMahon, T., Wearing, A., and Finlayson, B. (1994). Residential water use: Predicting and reducing consumption, *Journal of Applied Social Psychology*, 21, 611–619.

Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50, 179–211.

Albarracin, D., Johnson, B.T., Fishbein, M., and Muellerleile, P.A. (2001). Theories of reasoned action and planned behaviour as models of condom use: A meta-analysis. *Psychological Bulletin*, 127, 142–161.

Anker-Nilssen, P. (2003). Household energy use and the environment - a conflicting issue. *Applied Energy*, 76(1–3),189–196.

Armitage, C.J., and Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*, 40, 471–499.

Australian Bureau of Statistics (ABS). (2005). *Environmental Issues: People's Views and Practices*, Cat. No. 4602.0. Retrieved March 2, 2009 from http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/4B2EFD80 6DDA33CBCA2570C700729463/$File/46020_mar%202005.pdf.

Australian Bureau of Statistics (ABS). (2006). *Environmental Issues: People's Views and Practices*, Cat. No. 4602.0. Retrieved March 2, 2009 from http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/C5C112B3 DD1BCC72CA25722C00745DCD/$File/46020_mar%202006.pdf.

Australian Bureau of Statistics (ABS). (2007). *Environmental Issues: People's Views and Practices*, Cat. No. 4602.0. Retrieved March 2, 2009 from http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/3738673C7 B38F3F5CA2573A80011D614/$File/46020_mar%202007.pdf.

Ajzen, I., and Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Prentice-Hall: Englewood Cliffs, NJ.

Barr, S. (2007). Factors influencing environmental attitudes and behaviors: A U.K. case study of household waste management. *Environment and Behavior*, 39(4), 435–473.

Barr, S., and Gilg, A.W. (2005). Conceptualising and analyzing household attitudes and actions to a growing environmental problem: Development and application of a framework to guide local waste policy. *Applied Geography*, 25, 226–247.

Blue, C.L. (1995). The predictive capacity of the Theory of Reasoned Action and the TPBin exercise research: An integrated literature review. *Research in Nursing and Health*, 18, 105–121.

Brandon, G., and Lewis, A. (1999). Reducing household energy consumption: A qualitative and quantitative field study. *Journal of Environmental Psychology*, 19(1), 75–85.

Carrus, G., Passafaro, P., and Bonnes, M. (2008). Emotions, habits and rational choices in ecological behaviours: The case of recycling and use of public transportation. *Journal of Environmental Psychology*, 28(1), 51–62.

Cheung, S., Chan, D., and Wong, Z. (1999). Re-examining the theory of planned behaviour in understanding waste paper recycling. *Environment and Behavior*, 31, 587–617.

Chu, P., and Chiu, J. (2003). Factors influencing household waste recycling behavior: Test of an integrated model. *Journal of Applied Social Psychology*, 33(3), 604–626.

Cialdini, R.B., Reno, R.R., and Kallgren, C.A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, 58(6), 1015–1026.

Clark, C.F., Kotchen, M.J., and Moore, M.R. (2003). Internal and external influences on pro-environmental behavior: Participation in a green electricity program. *Journal of Environmental Psychology*, 23(3), 237–246.

Conner, M., and Armitage, C. (1998). Extending the Theory of Planned Behavior: A Review and Avenues for Further Research. *Journal of Applied Psychology*, 28(15), 1429–1464.

De Oliver, M. (1999). Attitudes and inaction: A case study of the manifest demographics of urban water conservation. *Environment and Behavior*, 31, 372–394.

De Young, R. (1988–1989) Exploring the differences between recyclers and nonrecyclers: The role of information. *Journal of Environmental Systems*, 18, 341–351.

Department of Climate Change and Energy Efficiency. (2010). *Reducing Australia's emissions*. Retrieved July 2, 2010 from http://www.climatechange.gov.au/government/reduce.aspx.

Ebreo, A., and Vining, J. (2001). How similar are recycling and waste reduction? Future orientation and reasons for reducing waste as predictors of self-reported behavior. *Environment and Behavior*, 33, 424–448.

Fielding, K.S., McDonald, R., and Louis, W.R. (2008). Theory of planned behaviour, identity, and intentions to engage in environmental activism. *Journal of Environmental Psychology*, 28, 318–326.

Fielding, K.S., Louis, W.R., Warren, C., and Thompson A. (2009) "Environmental sustainability in residential housing: understanding attitudes and behavior towards waste, water, and energy consumption and conservation among Australian households". AHURI Positioning Paper, Queensland Research Centre: Brisbane.

Gamba, R.J., and Oskamp, S. (1994), Factors influencing community residents' participation in commingled curbside recycling programs. *Environment and Behavior*, 26(5), 587–612.

Garnaut, R. (2008). *The Garnaut Climate Change Review*. Cambridge University Press: Melbourne.

Geller, E. S., Erickson, J. B., and Buttram, B. A. (1983). Attempts to promote residential water conservation with educational, behavioral and engineering strategies. *Population and Environment*, 6(2), 96–112.

Gmelch, L., and Dillman, J. (1988). House hold energy-conservation motivators: A factor analytic approach. *Housing and Society*, 13(3), 238–245.

Godin, G., and Kok, G. (1996). The Theory of Planned behaviour: A review of its applications to health-related behaviours. *American Journal of Health Promotion*, 11(2), 87–98.

Gonzales, M. H., Aronson, E., and Costanzo, M. A. (1988). Using social cognition and persuasion to promote energy conservation: A quasi-experiment. *Journal of Applied Social Psychology*, 18(12), 1049–1066.

Gregory, G.D., and Di Leo, M. (2003). Repeated behavior and environmental psychology: The role of personal involvement and habit formation in explaining water consumption. *Journal of Applied Social Psychology*, 33(6), 1261–1296.

Guerin, D.A., Yust, B.L., and Coopet, J.G. (2000). Occupant Predictors of Household Energy Behavior and Consumption Change as Found in Energy Studies Since 1975. *Family and Consumer Sciences Research Journal*, 29(1), 48–80.

Hagger, M.S., Chatzisarantis, N.L.D., and Biddle S.J.H. (2002). A meta-analytic review of Theories of Reasoned and Planned Behaviour in physical activity: Predictive validity and the contribution of additional variables. *Journal of Sport and Exercise Psychology*, 24(1), 3–32.

Harland, P. Staats, H., and Wilke, H.A. (1999). Explaining proenvironmental intention and behavior by personal norms and the Theory of Planned Behavior. *Journal of Applied Social Psychology*, 29 (12), 2505–2538.

Hornik,J., Cherian, J., Madansky, M., and Naryana, C. (1995). Determinants of Recycling Behavior: A Synthesis of Research Results. *The Journal of Socio-Economics*, 24(1), 105–127.

IPART (2007). *Residential energy and water use in Sydney, the Blue Mountains and Ilawarra: Results from the 2006 survey. Electricity, Gas and Water – Research Paper.* Retrieved July 15, 2009 from http://www.ipart.nsw.gov.au/search/search_results.asp?sidebarSearchTextBox=energy+use+blue+mountains&Search=Search

Knussen, C., and Yule, F. (2008). "I'm not in the habit of recycling": The role of habitual behavior in the disposal of household waste. *Environment and Behavior*, 40(5), 683–702.

Knussen, C., Yule, F., MacKenzie, J., and Wells, M. (2004). An analysis of intentions to recycle household waste: The roles of past behaviour, perceived habit, and perceived lack of facilities. *Journal of Environmental Psychology*, 24(2), 237–246.

Kurz, T., Donaghue, N., and Walker, I. (2005). Utilizing a social-ecological framework to promote water and energy conservation: A field experiment. *Journal of Applied Social Psychology*, 35(6), 1281–1300.

Mannetti, L., Pierro, A., and Livi, S. (2004). Recycling: Planned and self-expressive behaviour. *Journal of Environmental Psychology*, 24(2), 227–236.

Melbourne Water. (2010a). *Drought management*. Retrieved July 5 2010 from http://www.melbournewater.com.au/content/water_conservation/drought_management/drought_management.asp

Melbourne Water. (2010b). *Water system storage*. Retrieved July 5 2010 from http://www.melbournewater.com.au/content/water_storages/water_report/zoom_graph.asp

Nolan, J M., Wesley Schultz, P., Cialdini, R B., Goldstein, N J., and Griskevicius, V. (2008). Normative Social Influence is Underdetected. *Personality and Social Psychology Bulletin*, 34, 913–923.

Northern Territory Government. (2010). NT Waterwise Central Australia Rebate Scheme. Retrieved July 5, 2010 from http://www.nt.gov.au/nreta/water/wise/rebates/faq.html#save_water.

Ouellette, J. A., and Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin*, 124, 54–74.

Pallak, M. S., and Cummings, N. (1976). Commitment and voluntary energy conservation. *Personality and Social Psychology Bulletin*, 2(1), 27–31.

Queensland Water Commission. (2010a). *Bulk water prices*. Retrieved July 5, 2010 from http://www.qwc.qld.gov.au/Bulk+water+prices.

Queensland Water Commission. (2010b). *Demand management*. Retrieved July 5, 2010 from http://www.qwc.qld.gov.au/Demand+management.

Randolph, B., and Troy, P. (2008). Attitudes to conservation and water consumption. *Environmental Science and Policy*, 11, 441–455.

Robinson, G.M., and Read, A.D. (2005). Recycling behaviour in a London Borough: Results from large-scale household surveys. *Resources Conservation and Recycling*, 45, 70–83,

Russell, S. and Fielding, K.S. (2010). Water demand management research: A psychological perspective. *Water Resources Research*, 46, W05302, doi:10.1029/2009WR008408.

Sandu, S., and Petchey, R. (2009). *End use energy intensity in the Australian economy. ABARE research report 09.17*. Canberra, Australia: Commonwealth of Australia.

Schultz, P. W., Oskamp, S., and Mainieri, T. (1995). Who recycles and when? A review of personal and situational factors. *Journal of Environmental Psychology*, 15, 105–121.

Seqwater. (2010). Latest dam levels. Retrieved August 5, 2010 from http://seqwater.com.au/public/dam-levels.

Sparks, P., and Shepherd, R. (1992). Self-identity and the theory of planned behavior—assessing the role of identification with green consumerism. *Social Psychology Quarterly*, 55, 388–399.

Spoehr, J., Davidson, K., Wilson, L. (2006). *An evaluation of the energy efficiency program for low income households*. Adelaide, South Australia: Australian Institute for Social Research (University of Adelaide).

Staats, H., Harland, P., Wilke, H.A.M. (2004). Effecting Durable Change: A Team Approach to Improve Environmental Behavior in the Household. *Environment and Behavior*, 36(3), 341–367.

Steg, L., and Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, *29(3), 309-317*.

Terry, D. J., Hogg, M. A., and White, K. M. (1999). The theory of planned behaviour: Self-identity, social identity and group norms. *British Journal of Social Psychology*, 38, 225–244.

Tonglet, M., Phillips, P. S., and Read, A. D. (2004). Using the Theory of Planned Behaviour to investigate the determinants of recycling behaviour: A case study from Brixworth, UK. *Resource, Conservation and Recycling*, 41, 191–204.

Troy, P., Holloway, D., and Randolph, B. (2005). *Water use and built environment: Patterns of water use in Sydney*. Retrieved July 15, 2009 from http://www.fbe.unsw.edu.au/cf/publications/researchpapers/attachments/researchpaper1.pdf

Wang, Y-D., Song, J-S., Byrne, J., and Yun, S-J. (1999). Evaluating the persistence of residential water conservation: A 1992–1997 panel study of a water utility program in Delaware. *JAWRA Journal of the American Water Resources Association*, 35(5), 1269–1276.

APPENDIX A: SCALE CONSTRUCTION

A household culture scale was created by averaging the four items assessing this construct. The scale had good internal reliability ($\alpha = 0.88$).

Measures of past water conservation and energy conservation actions and past waste minimisation actions were included in the survey. In the case of the water and energy efficiency actions, scales were created to reflect the overall level of water and energy efficiency of households. In the case of water conservation a water efficiency index was created that reflected the number of water-efficient devices that a home had installed inside and outside of the home. Separate scales were created because of the recognition that some households did not have gardens, and therefore outside water efficiency measures did not apply. For each device that had already been installed, respondents received a 1 (and 0 if the device had not been installed). The five devices that are installed inside the house (low flow taps/showerheads, water-efficient dishwasher, water-efficient washing machine, dual-flush toilet, shower timer) were summed to form the inside water-efficient index, and the four devices (trigger hose/timed water system, pool cover, rainwater tank, greywater system) were summed to form an outside water efficiency index. Scores on the indoor water efficiency index could range from 0 to 5 and scores on the outdoor water efficiency index could range from 0 to 4.

An energy efficiency index was also created. Again, for each device that respondents had installed they received 1 (and 0 if not installed). Thus, the six energy efficiency items (see Table 2) were summed to form the energy efficiency index. Scores on this index could range from 0 to 6.

Scales were also created to reflect overall past water and energy curtailment behaviours and waste minimisation behaviours. The questions assessing how much participants had engaged in each of the water curtailment behaviours were averaged to form a water curtailment behaviour scale. The same procedure was used to form an energy curtailment behaviour scale and a waste minimisation behaviour scale.

APPENDIX B: DEMOGRAPHIC COMPARISONS OF BRISBANE AND MELBOURNE RESPONDENTS

Table B1: Mean age, number of residents in household, and number of bedrooms of Brisbane and Melbourne respondents

Demographic variable	Brisbane mean	Melbourne mean	t	d.f.	P
Age	48.75	47.68	1.34	1192	0.1800
No. of residents	2.84	2.82	0.15	1192	0.8800
No. of bedrooms	3.31	3.11	3.84	1192	0.0001

Table B2: Percentage of males and females who completed the survey in Brisbane and Melbourne

Gender	Brisbane per cent	Melbourne per cent
χ^2 (1, n = 1194) = 2.13, P = 0.14		
Male	50.4	54.6
Female	49.6	45.4

Table B3: Percentage of Brisbane and Melbourne respondents in each household income category

Income category	Brisbane per cent	Melbourne per cent
χ^2 (5, n = 1194) = 8.47, P = 0.13		
Up to $31 200	15.6	16.9
$31 200–52 000	20.0	18.4
$52 001–78 000	18.3	19.6
$78 001–104 000	18.0	17.4
More than $104 000	16.1	11.8
Prefer not to respond	12.0	16.0

Table B4: Percentage of Brisbane and Melbourne respondents who completed each level of education

Education level	Brisbane per cent	Melbourne per cent
χ^2 (4, n = 1194) = 17.21, P = 0.002		
Primary school	2.3	0.7
Secondary school	35.3	32.4
Trade/TAFE	34.1	29.0
Undergraduate	17.8	23.1
Postgraduate	10.5	14.8

Table B5: Percentage of Brisbane and Melbourne respondents in each tenure category

Household tenure	Brisbane per cent	Melbourne per cent
χ^2 (4, n = 1194) = 6.79, P = 0.13		
Own home with mortgage	38.9	38.3
Own home with no mortgage	28.0	33.7
Rent from private landlord	22.8	19.9
Rent from public landlord	7.7	6.6
Other	2.7	1.5

Table B6: Percentage of Brisbane and Melbourne respondents in each dwelling type

Dwelling type	Brisbane per cent	Melbourne per cent
χ^2 (3, n = 1194) = 10.79, P = 0.013		
Free-standing house	81.9	74.0
Semi-detached townhouse	6.8	9.9
Unit of flat in building	11.0	15.7
Other	0.3	0.3

Table B7: Percentage of Brisbane and Melbourne respondents with each garden type

Size of garden	Brisbane per cent	Melbourne per cent
χ^2 (3, n = 1194) = 6.36, P = 0.095		
Small garden	27.1	24.5
Medium garden	40.1	46.5
Large garden	25.3	23.8
No garden	7.5	5.2

APPENDIX C: PRELIMINARY ANALYSES COMPARING RESPONDENTS WHO COMPLETED THE CURTAILMENT VS. THE EFFICIENCY VERSION OF THE SURVEY

A series of t-tests and Chi-square analyses revealed that the two groups of respondents did not significantly differ in age (Brisbane: $t(599)$ = -0.26, P = 0.798; Melbourne: $t(591)$ = 0.38, P = .71), gender ratio (Brisbane: $\chi^2(1, n = 601)$ = 3.38, P = 0.066; Melbourne: $\chi^2(1, n = 593)$ = 1.55, P = 0.213), household income (Brisbane: $\chi^2(5, n = 601)$ = 6.59, P = 0.253; Melbourne: $\chi^2(5, n = 593)$ = 6.97, P = 0.223), level of education (Brisbane: $\chi^2(4, n = 601)$ = 1.58, P = 0.813; Melbourne: $\chi^2(4, n = 593)$ = 1.87, P = 0.760), number of residents in the house (Brisbane: $t(599)$ = -0.13, P = 0.896; Melbourne: $t(591)$ = -0.71, P = 0.481), household tenure (Brisbane: $\chi^2(4, n = 601)$ = 0.22, P = 0.994; Melbourne: $\chi^2(4, n = 593)$ = 2.29, P = 0.683), dwelling type (Brisbane: $\chi^2(3, n = 601)$ = 1.39, P = 0.708; Melbourne: $\chi^2(3, n = 593)$ = 4.01, P = 0.260), number of bedrooms (Brisbane: $t(599)$ = 0.18, P = 0.860; Melbourne: $t(591)$ = -0.23, P = 0.820), and size of garden (Brisbane: $\chi^2(3, n = 601)$ = 1.70, P = 0.640; Melbourne: $\chi^2(3, n = 593)$ = 0.62, P = 0.891). Thus, there is no evidence of systematic differences.

APPENDIX D: WATER CONSERVATION

To streamline the reporting of data, inferential test statistics relating to the demographic comparisons were not reported in the main body of the report. Instead they are reported in Appendices D to G. Note that only statistically significant results are reported.

Water curtailment actions

Comparison of renters and owners

Comparison of renters' and owners' water curtailment actions showed that for Brisbane respondents, renters and owners differed in the extent to which they check and fix leaking taps ($F(1,593) = 15.27$, $P < 0.001$), only run the dishwasher when it is full ($F(1,344) = 6.65$, $P = 0.01$), use half flush or don't flush every time ($F(1,583) = 25.87$, $P < 0.001$), wash the car with minimal water ($F(1,511) = 8.35$, $P = 0.004$), turn off the tap when brushing teeth ($F(1,591) = 8.54$, $P = 0.004$), and are water-wise in the garden ($F(1,545) = 7.23$, $P = 0.007$). In all cases, owners reported engaging in more of these actions than renters.

For Melbourne respondents, renters and owners differed in the extent to which they check and fix leaking taps ($F(1,581) = 9.82$, $P = 0.002$), only run the dishwasher when it is full ($F(1,351) = 32.11$, $P < 0.001$), have shorter showers ($F(1,589) = 4.61$, $P = 0.032$), use half flush or don't flush every time ($F(1,581) = 8.68$, $P = 0.003$), and are water-wise in the garden ($F(1,544) = 5.80$, $P = 0.016$). In all cases owners engaged in more of these actions than renters.

Comparison of household composition groups

For Brisbane respondents the only significant differences to emerge across household composition groups was on frequency of using greywater on the garden $F(2, 598) = 10.51$, $P < 0.001$) and being water-wise in the garden ($F(2, 598) = 11.91$, $P < 0.001$). Post hoc tests showed that family households used greywater significantly less frequently compared to single-adult and multiple-adult households. Similarly, family households were significantly less likely to be water-wise in their garden compared to single-adult and multiple-adult households.

Comparison of household income groups

Among Brisbane respondents, household income groups differed on past showering behaviour ($F(2, 527) = 10.30$, $P = 0.0001$) and whether they were water-wise in the garden ($F(2, 483) = 6.93$, $P = 0.001$). All household income groups differed from each other such that low-income households reported the most short showers followed by medium and high-income households (low income mean = 4.50, medium income mean = 4.30, high income mean = 4.07). Low-income households also reported engaging in more water-wise behaviour in the garden than medium or high-income households (low income mean = 4.68, medium income mean = 4.50, high income mean = 4.36).

Among Melbourne respondents, household income groups differed in the extent to which they had used greywater on the garden ($F(2, 410) = 4.67$, $P = 0.01$): low-income households had used greywater more on their garden than high-income households (low income mean = 3.92, medium income mean = 3.66, high income mean = 3.29).

Water efficiency actions

Comparison of owners and renters

Among Brisbane respondents, owners were more likely than renters to have installed low-flow taps and showerheads (χ^2 (1, n = 601) = 17.67, P < 0.001), a pool cover (χ^2 (1, n = 601) = 8.70, P = 0.003), a hose with trigger or timed water system (χ^2 (1, n = 601) = 31.26, P < 0.001), a water-efficient dishwasher (χ^2 (1, n = 601) = 14.51, P < 0.001), and a dual-flush or composting toilet (χ^2 (1, n = 601) = 11.86, P < 0.001).

Among Melbourne respondents, owners were more likely than renters to have installed low-flow taps and showerheads (χ^2 (1, n = 593) = 10.36, P < 0.001), a hose with trigger or timed water system (χ^2 (1, n = 593) = 30.95, P < 0.001), water-efficient dishwasher (χ^2 (1, n = 593) = 48.60, P < 0.001), rainwater tank (χ^2 (1, n = 593) = 23.32, P < 0.001), and dual-flush or composting toilet (χ^2 (1, n = 593) = 20.90, P < 0.001).

Comparison of household composition groups

Among Brisbane respondents, multiple adult and family households were more likely to have installed a rainwater tank (χ^2 (1, n = 601) = 9.61, P = 0.008) than single-person households. Among Melbourne respondents, more family households and multiple adult households had installed a water-efficient dishwasher (χ^2 (1, n = 593) = 17.45, P < 0.001) than single-person households.

Comparison of household income groups

Among Brisbane respondents, household income groups significantly differed in whether they had installed a water-efficient dishwasher (χ^2 (2, n = 529) = 12.10, P = 0.002): the number of households who had installed a water-efficient dishwasher was lowest in the low-income households, higher in the medium-income households, and higher in the high-income households with a majority of high-income households having installed a water-efficient dishwasher.

The same finding emerged for Melbourne respondents (χ^2 (2, n = 498) = 13.16, P = 0.001).

Intentions to install water-efficient devices

Comparison of owners' and renters' future intentions

Comparing owners and renters on their intentions to install the water-efficient devices, the only significant difference to emerge was among Melbourne respondents: owners were more likely to intend to install a rainwater tank than renters (owners: mean = 3.45, renters: mean = 2.92; F(1,326) = 9.84, P = 0.002).

Comparison of household composition groups

Comparisons across household composition groups showed that among Brisbane respondents, family households had significantly lower intentions to install a greywater system compared to single-adult and multiple-adult households (single adult mean = 4.63, multiple adult mean = 4.51, family mean = 3.89; F(2, 598) = 6.52, P = 0.002). There were no significant differences across household composition for Melbourne respondents.

Comparison of household income groups

There were no differences in intentions across household income groups for either Brisbane or Melbourne respondents.

Reported changes in water use

Comparison of owners and renters

A significant difference emerged between Melbourne owners' and renters' reported change in water use (owners mean = 2.16, renters mean = 2.77; $F(1,573) = 34.97$, $P < 0.001$) with owners reporting decreasing their water use more than renters.

Comparison of household composition groups

In Brisbane, differences across household composition groups emerged on perceptions of changes in household water use ($F(2,588) = 8.87$, $P < 0.001$). Respondents in single and multiple adult households reported decreasing their water use more than family households.

Comparison of household income groups

Differences across household income groups emerged among Brisbane respondents for water use ($F(2,520) = 5.39$, $P = 0.005$). Low income household respondents reported decreasing water use more than medium or high-income households.

APPENDIX E: ENERGY CONSERVATION

To streamline the reporting of data, inferential test statistics relating to the demographic comparisons were not reported in the main body of the report. Instead they are reported in Appendices D to G. Note that only statistically significant results are reported.

Energy curtailment actions

Comparison of household composition groups

In Brisbane, single-person households were more likely to switch off unused appliances compared to multiple-adult or family households ($F_{(2, 598)} = 8.55$, $P < 0.001$). Family households were significantly less likely to dry clothes on the line rather than in the dryer ($F_{(2, 598)} = 4.57$, $P = 0.01$) and switch computers and electronic equipment off at the wall ($F_{(2, 598)} = 5.12$, $P = 0.006$) compared to single-person and multiple-adult households.

In Melbourne, family households were less likely to run air conditioners at an efficient temperature compared to single-person households ($F_{(2, 590)} = 5.141$, $P = 0.006$).

Comparison of household income groups

Among Brisbane respondents, there were significant differences in running air conditioners or heaters at efficient temperatures ($F_{(2, 405)} = 5.06$, $P = 0.007$), drying clothes on the line rather than in a dryer ($F_{(2, 517)} = 8.18$, $P = 0.0001$), switching off unused lights ($F_{(2, 528)} = 10.62$, $P = 0.0001$), and switching off unused appliances at power points ($F_{(2, 528)} = 9.15$, $P = 0.0001$). Across all of these measures low-income households engaged in more of the actions than high-income households with medium-income households behaving more or less like the other groups depending on the type of energy conservation action. Although the differences did not reach the $P < 0.01$ level of significance, it was also clear that low-income households used cold water to wash, switched off electronic equipment and kept doors and windows closed when operating heating or cooling more often than high-income households.

Among Melbourne respondents, household income groups significantly differed in whether they dried clothes on the line rather than a clothes dryer ($F_{(2, 485)} = 9.24$, $P = 0.0001$) and whether they switched off unused appliances at the power point ($F_{(2, 498)} = 5.02$, $P = 0.007$). As with Brisbane respondents, low-income households engaged in more of these actions than high-income households. A similar pattern emerged on using cold water to wash.

Energy efficiency actions

Comparison of owners and renters

Looking at comparisons across owners and renters, among Brisbane respondents, more owners had installed compact fluorescent lighting ($\chi^2 = 9.80$, $P = 0.002$) and household insulation ($\chi^2 = 57.31$, $P < 0.001$) than renters. Among Melbourne respondents, more owners than renters had installed compact fluorescent lighting ($\chi^2 = 9.32$, $P = 0.002$), household insulation ($\chi^2 = 75.36$, $P < 0.001$), and white goods and appliances with four star Australian energy ratings or above ($\chi^2 = 13.40$, $P < 0.001$).

Comparison of household composition groups

In Melbourne, multiple adult households were most likely to have installed electronic equipment with energy star ratings and family households were the least likely (χ^2 (1, n = 593) = 10.77, P = 0.005).

Intentions to install energy-efficient appliances

Comparison of owners and renters

Comparisons across tenure showed that among Brisbane respondents, owners compared to renters had stronger intentions to install solar panels (F(1,466) = 9.41, P = 0.002). There was also an interaction between tenure and survey type on intentions to install compact fluorescent lighting (F(1,183) = 9.02, P = 0.003). Simple effects analyses show that owners did not differ in their intentions across survey types (curtailment survey mean = 3.14, efficiency survey mean = 3.29); however, renters who completed the efficiency survey had stronger intentions to install compact fluorescent lighting than renters who completed the curtailment survey (renters mean = 4.03, owners mean = 3.05). This finding suggests that the survey primed responses from Brisbane renters. It should be noted that although owners had stronger intentions than renters to install solar panels, the mean responses still fell below the mid-point of the scale, suggesting that they were unlikely to install these devices.

Among Melbourne respondents, owners compared to renters had stronger intentions to install insulation (F(1,122) = 7.25, P = 0.008).

Changes in energy use

Comparison of owners and renters

Among the Melbourne respondents there was a significant difference between owners and renters on changes in energy use (F(1,576) = 10.34, P = 0.001): Owners reported decreasing their water and energy use and the amount of waste produced more than renters.

Comparison of household composition groups

In Brisbane, differences across household composition groups emerged on perceptions of changes in energy use (F(2,586) = 14.51, P < 0.001). Respondents in single and multiple-adult households reported decreasing their energy use more than family households.

APPENDIX F: WASTE MINIMISATION

Waste minimisation actions

Comparison of owners and renters

Among Melbourne respondents, owners reported reusing plastic bags more ($F_{(1,581)}$ = 7.47, P = 0.006) and buying goods that they don't need less often ($F_{(1,77)}$ = 8.17, P = 0.004) than renters.

Comparison of household composition groups

In Brisbane multiple-adult households reported using their own bags when shopping significantly more than single-person or family households ($F_{(2, 598)}$ = 6.41, P = 0.002).

Comparison of household income groups

The only difference to emerge for household income groups is that in Brisbane, low-income households were more likely to take their own bags shopping than medium or high-income households ($F_{(2, 526)}$ = 5.65, P = 0.004).

Changes in waste produced

Comparison of owners and renters

Among the Melbourne respondents there was a significant difference between owners and renters on changes in waste produced ($F_{(1,593)}$ = 14.11, P = 0.0001). Owners reported decreasing the amount of waste produced more than renters.

Comparison of household composition groups

In Brisbane, differences across household composition groups emerged on perceptions of changes in the amount of waste produced ($F_{(2,586)}$ = 9.32, P < 0.001). Respondents in single and multiple-adult households reported decreasing their waste, energy and water use more than family households.

Comparison of household income groups

Differences across household income groups also emerged among Brisbane respondents for the amount of waste produced ($F_{(2,516)}$ = 6.32, P = 0.002). Low-income households reported reducing this the most, followed by medium-income households and then high-income households.

APPENDIX G: POLICY RESPONSES

Support for policies

Comparison of owners and renters

Among Brisbane respondents, there were significant differences between owners and renters in their acceptance of households changing their everyday actions ($F(1,597) = 6.67$, $P = 0.01$), households installing energy and water-efficient appliances ($F(1,597) = 12.44$, $P < 0.001$), increasing the price of energy, water and waste collection beyond an agreed usage limit ($F(1,597) = 6.76$, $P = 0.01$). Owners were more supportive of the non-economic policies, whereas renters were more supportive of the economic-related policies.

Among Melbourne respondents, the only significant difference to emerge between owners and renters was for households changing their everyday actions ($F(1,589) = 8.99$, $P = 0.003$): owners were more supportive of this policy than renters.

Perceived fairness of the policies

Comparison of owners and renters

Comparisons of owners' and renters' perceptions of fairness showed that among Brisbane respondents, owners and renters differed in the perceived fairness of households changing their everyday behaviours ($F(1,597) = 7.99$, $P = 0.005$), taxes on products that are not environmentally sustainable ($F(1,597) = 13.28$, $P < 0.001$), increasing the price of energy, water, and waste collection ($F(1,597) = 8.58$, $P = 0.004$), and increasing the price of energy, water and waste collection beyond an agreed limit of usage ($F(1,597) = 7.11$, $P = 0.008$). Owners perceived the policy of households changing behaviour to be fairer than renters, whereas renters perceived taxes and increasing prices to be fairer than owners.

Perceived fairness to vulnerable groups

Comparison of owners and renters

Among Melbourne respondents, owners nominated increasing the price of energy, water and waste collection (χ^2 (1, $n = 593$) = 10.72, $P < 0.001$) and increasing the price of energy, water and waste collection beyond an agreed limit of usage (χ^2 (1, $n = 593$) = 7.21, $P = 0.007$) as unfair more often than renters.

Comparison of household income groups

Comparisons across household income groups showed that the only difference to emerge was among Brisbane respondents on whether they cited increasing the price of energy, water and waste beyond an agreed limit as unfair to vulnerable groups: respondents from low-income households cited this policy more often than medium or high-household income respondents (χ^2 (2, $n = 529$) = 10.31, $P = 0.006$).

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